THE IRON AGE

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SIX TIMES LONGER SERVICE IS RECORD OF NEW PLATES

Abrasive-Resisting Plate Use Reveals Economy and Good Fabricating Qualities

Cylindrical rotating screens for washing gravel are used by a buyer of Bethlehem Abrasive-Resisting Steel Plate. More than a year ago the company decided to apply the Bethlehem Abrasive-Resisting Plate to this service.

"The screens lasted twelve months —six times as long as the screens we used formerly, made of ordinary steel," this user reported. "During this time they were handling about 1500 cu. yds. of hard quartzite each 24 hours."

The fabricating quality as well as the economy of Bethlehem Abrasive-Resisting Plate is illustrated by its use in these screens. Each screen is 54 in. in diameter and 20 ft. long, made of plates perforated with $\frac{7}{16}$ in. drilled holes.

RESISTS WEAR

Stone crusher, containing screens made of Bethlehem Abrasive-Resisting Plate. The application is similar to that in the gravel screens described above, in which Bethlehem Abrasive-Resisting Plate lasted six times as long as ordinary plate, the user said.

Bethlehem Abrasive-Resisting Steel Plate is now being used in road-building equipment, in the brick and other ceramic industries and in the handling of coal, coke, gravel and many other abrasive materials. Its low cost and ability to take simple forming operations make this Bethlehem Plate the logical choice for applications exposed to abrasive wear.

LARGE HEAD ORDERS SHIPPED PROMPTLY

Bethlehem Flange Shop Geared for Quick Service

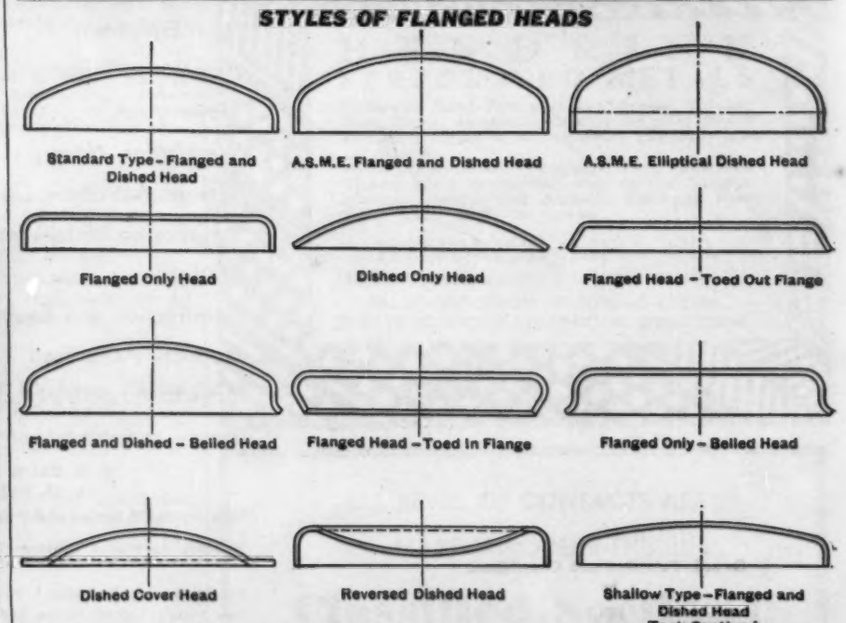
The location of the Bethlehem Flanging Shop, with plate mills and open-hearth furnaces, even blast furnaces, right at hand, enables Bethlehem quickly to fill the largest orders.

Even when the necessary steel plates have to be rolled, it is not uncommon for Bethlehem to complete and ship orders of substantial size for flanged and dished heads within from 24 to 36 hours after the orders are placed.

HEADS IN BETHLEHEM SHOP

Flanged Heads in the Bethlehem Flange Shop at Sparrows Point, Md., ready for shipment.

STYLES OF FLANGED HEADS


Standard Type – Flanged and Dished Head
A.S.M.E. Flanged and Dished Head
A.S.M.E. Elliptical Dished Head
Flanged Only Head
Dished Only Head
Flanged Head – Toed Out Flange
Flanged and Dished – Belled Head
Flanged Head – Toed In Flange
Flanged Only – Belled Head
Dished Cover Head
Reversed Dished Head
Shallow Type – Flanged and Dished Head Tank Car Head

A wide variety of types and sizes of Flanged only, Dished only or Flanged and Dished Heads is produced by modern equipment in the Bethlehem Flange Shop. The location of the shop, next door to our plate mill, and near open-hearths and even blast furnaces, enables Bethlehem quickly to fill the largest orders.

BETHLEHEM STEEL COMPANY

GENERAL OFFICES: BETHLEHEM, PA.

▲▲▲ THE IRON AGE ▲▲▲

OCTOBER 24, 1935

ESTABLISHED 1855 Vol. 136, No. 17

In Buying Security, Who Pays for What?

WHEN Uncle Sam conducts a "bargain sale," in competition with private business enterprise, his customers usually pay well for what they buy.

Take the case of the Social Security Act. It has the commendable purpose of providing pensions to workers at the age of 65 through a six per cent tax on all payrolls and also a limited unemployment insurance at an additional three per cent tax. One-third of this is paid by the worker through automatic deductions or "check-offs" from his wages. The other two-thirds is a tax paid by the employer but eventually coming—most of it—out of pay envelopes.

Ostensibly, the "boss" pays two-thirds of the insurance bill. But does he? The tax paid by the boss, remember, is not a tax on profits. Like the AAA processing taxes, it is a direct addition to cost of production. It increases the labor cost of all production exactly six per cent.

It is axiomatic that the buyer of a product pays the entire cost of production. It makes no difference what the cost items include. The consumer pays the labor bill, large or small, as well as the cost of raw materials, supervision, power and all the other items. Even the members of our "brain trust" are not naive enough to hold a different belief.

Thus the consumer must pay the bill, imposed by this pay roll tax, just as the consumer is paying the bill, through increased food prices, for the AAA processing taxes. And since over 80 per cent of the consumers of our country depend directly or by marriage upon pay envelopes, it is obvious that the wage earner will contribute much more than his direct 3 per cent check-off for what he gets in the way of security.

Leaving aside the question of who pays the bill, what does Uncle Sam give for the money received? Take the case of a worker of 25 years of age earning $1800 a year. The cost of his insurance, at 9 per cent, will be $162 a year.

In case of unemployment, he can draw $15 a week for ten weeks. At age 65, he will be entitled to a pension of $61.25 per month for the rest of his life or until $2520 has been refunded to his estate.

If this same premium were paid regularly to any one of our first class insurance companies, cash values accruing would provide the insured, after five years, with $15 a week for 37 weeks; after 20 years with $15 a week for 232 weeks. At the age of 65 he would be eligible for a pension of $83 a month for life or until $12,058 had been refunded to his estate.

When Uncle Sam competes with private initiative, he offers his customers no bargains.

J. H. Van Deventer

▲ ▲ ▲ Testing

o o o

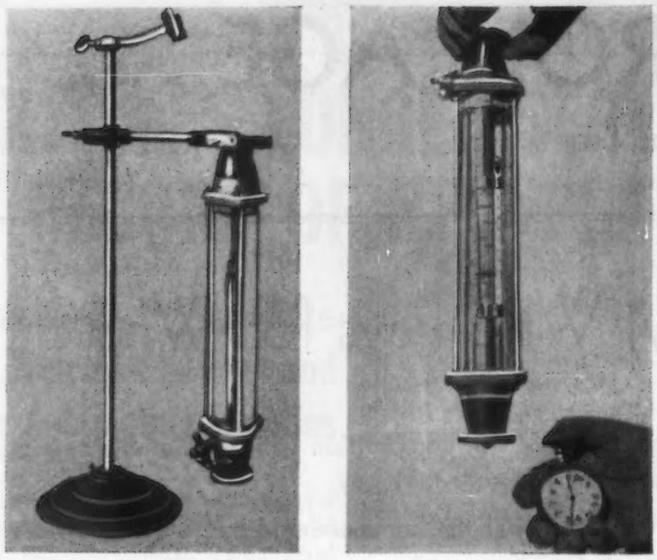


FIG. 1—The Steiner viscometer. The laboratory model is at the left and the portable model is shown at the right. By means of this instrument, the viscosity of any oil is expressed by the number of seconds required for an air bubble to rise in the oil a definite distance.

THE wizardry of modern scientific control of thermal operations in the contemporary iron or steel plant has, without doubt, banished many an inadequate method of producing and maintaining essential heat in metallurgical furnaces. Man's amazing progress in this respect may best be appreciated by a brief glance backward over the span of several centuries. Thus, for example, the heating of industrial furnaces by means of wood and charcoal in Agricola's period has long since been supplanted by applied combustion of liquid and gaseous fuels through the use of burners of more modern design and construction, thereby attaining temperatures and efficiencies heretofore impossible.

As a result of these tendencies, the engineer of today depends more than ever on the accuracy as well as reliability of the numerous technological tests, from which he may be able to select the specific type of fuel best suited to his particular purpose. The importance and value of similar information were therefore clearly demonstrated in the practical utilization of data pertaining to fundamental properties of fuel oils and to some extent also to those of modern lubricants.

Unfortunately, desirable information in respect to some of these properties has not been very widely disseminated to the engineering profession, for which reason a wise application of many important characteristics of liquid fuels is not at all comprehensive. This is particularly true in reference to the technical supervision of steel plants and ferrous foundries, where until recently a single test —the determination of gravity— seemed to be indicative of the quality or lack of quality of a particular shipment of fuel oil.

The conventional practice of grading fuel oils by gravity is slowly being abandoned in favor of more elaborate laboratory tests. Chemical and especially physical characteristics of fuel oils are constantly being stressed in most specifications issued by iron or steel manufacturers. Accurate laboratory tests are required in order to determine gravity, chemical analysis, calorific value, ash, basic sediment and water, flash and fire points, pouring properties at low temperatures, color and viscosity. While all these items play a role in the future burner efficiency and should, for this reason, be taken into consideration by the metallurgist and fuel engineer, there is rarely a plant in the United States which determines all these properties with every tank car of received fuel oil. In order to illustrate the subsequent explanation for this apparent lack of control several series of tests made with oils of varying origin are presented in Table I.

When scrutinizing the data in this table, it is at once apparent that the chemical composition of fuel oils varies within relatively narrow limits. That is, light or heavy fuel oils disclose almost identical concentrations of carbon, hydrogen, nitrogen and oxygen, but differ in their sulphur contents. The variations in calorific values are also small, their range being from about 18,500 to 19,450 B.t.u. per lb. Of the remaining characteristics, specific gravity is known to be somewhat of a crude index also to flash and fire points. The relationship between the several expressions of gravity and the calorific values of fuel oils has been amply described by the United States Bureau of Standards, for which reason a discussion may be omitted in this article.

Routine inspections of fuel oils may consequently be made at least in two principal directions, namely in regard to gravity and with reference to viscosity. Gravity is easily determined by means of oil hydrometers or else in accordance with analytical methods. The contemporary procedures for testing viscosity vary in many industrial countries of the world. Accordingly, the Saybolt test is used in the United States, the Barbey test in France, the Engler test in Central Europe, the Redwood test in Great Britain, the Lamansky-Nobel test in Russia, etc.

Saybolt Test Questioned

For many years, the majority of American oil producers and conse-

Metallurgical Fuel Oils

By JOHN H. HRUSKA
Metallurgical Engineer, Berwyn, Ill.

quently the entire steel industry have accepted the Saybolt Universal or Saybolt Furol Viscosimeter as their standard method of testing the viscosity of fuel oils. The American Society for Testing Materials has incorporated this test in its standard No. D88-33, the American Petroleum Institute standardized it as its No. 518-33 and the American Standards Association finally adopted it is Z 11.2-1933. Irrespective of this fact, numerous oil technologists, metallurgists and chemists agree on the lack of precision and essential speed of the Saybolt test. This is particularly true when testing oils at higher temperatures. Successful performance of metallurgical furnaces fired with oil hinges directly on the kinematic properties of the fuel at elevated temperatures.

Standardization of arbitrarily selected temperatures at which to test oil for its viscosity does not give any clue to its behavior at other temperatures. It is well known that fuel oils used generally for industrial heating may meet exactly some specified viscosity at one of the standardized temperatures and yet they may have radically different properties below or above that temperature. On the contrary, complete viscosity curves which include the actual temperatures at which the oil reaches the furnace burner may serve as indices of its resistance to future atomization or vaporization respectively. The usefulness of viscosity curves in grading fuel oils was, in the past, markedly curtailed by the numerous inconsistencies noted when plotting such diagrams from standardized temperature-viscosity measurements. This fact may explain the scarcity of similar curves in either the technical press or in reports to managements of industrial plants. In order to enhance the general reliability of viscosity data and particularly of viscosity curves, some comments are offered in the following paragraphs on the most modern procedures for testing this important property of fuel oils.

The conventional Saybolt test is based on the exact measurement of time consumed by a definite amount of oil (60 c.c.) to pass through an accurately dimensioned orifice in the bottom of a small container. The hydraulically simple phenomenon of a steady discharge of liquid matter through an opening, accompanied by a conversion of the pressure head into a velocity head within the orifice, becomes considerably obscured by numerous influences: In precision testing it becomes inevitable to introduce corrective factors with reference to temperature differences, cooling or heating effects at the point of discharge, contraction at various temperatures, friction, etc. A careful study of these factors in connection with existing and recently developed methods of testing viscosity seems to indicate quite clearly that something like a reversal in the principle of Saybolt, Redwood, Engler and similar tests should be advocated. With this in mind, L. Steiner of Czechoslovakia developed a new viscosimeter whereby viscosity is expressed by the number of seconds required for an air bubble to rise through a very small (about one-twelfth of the amount needed in the Saybolt test) sample of oil to be investigated. Since temperature tests are easily made by heating or cooling the entire apparatus, all necessary determinations for a complete temperature-viscosity curve may be made within half an hour—with far greater accuracy than any of the standardized methods.

EACH year steel mills consume an enormous amount of fuel oil in their furnaces. The quality of these oil shipments are usually estimated by finding the specific gravities, although gravity determinations are generally known to give an inaccurate picture of the suitability of oils for metallurgical purposes. The author herein points out that an accurate check on the viscosity would be more valuable, and describes the Steiner test, which is shown to be quicker and simpler in operation and also more accurate than the better known Saybolt test for viscosity. The Steiner test gives viscosity at one temperature; moreover, a complete temperature-viscosity curve can quickly be obtained even by unskilled workers.

Steiner Test Described

Probably the principal part of the new Steiner viscometer is a thoroughly calibrated glass tube, both ends of which are ground inside and may be closed by tightly fitting glass stoppers. As mounted into the apparatus, this tube is surrounded by a glass cylinder. The space between the tube and the cylinder is filled with 220 gm. of glycerine, which amount of fluid suffices to maintain a uniform temperature of the tested fuel oil inside the measuring tube. A small space above the glycerine is left for thermal expansion when making high temperature tests. This

Table I

Technological Properties of Fuel Oils Used in the Iron and Steel Industry

Origin of Fuel Oil	Grade No.	Specific Gravity Actual	Specific Gravity Deg. Bé	Chemical Composition in Per Cent C	H_2	N_2O_2	S	Flash Point Deg. F.	Fire Point Deg. F.	Calorific Value B.t.u. per Lb.
United States, Pa.	4	0.899	26	84.6	13.8	1.3	0.2	...	...	19,220
United States, Pa.	5	0.934	20	...	...	..	..	225	260	19,040
United States, Pa.	6	0.986	12	83.4	10.2	2.3	0.1	298	315	18,600
United States, Tex.	4	0.912	24	85.2	12.1	1.6	1.6	...	...	19,150
United States, Tex.	5	0.960	16	84.4	11.0	2.9	0.7	226	261	18,820
United States, Cal.	6	0.984	12	86.1	11.9	..	0.8	301	322	18,540
Mexico	5	0.943	18	83.0	11.6	3.0	3.1	124	178	18,980
Mexico	4	0.914	24	82.8	12.2	2.1	3.3	...	...	19,200
Russia	3	0.882	29	86.0	13.2	0.9	0.3	...	...	19,390
Russia	4	0.919	22	86.4	12.7	1.1	0.2	...	...	19,100
Russia	5	0.944	18	85.7	13.9	2.0	0.2	...	...	19,000
Russia	5	0.950	17	...	...	..	..	176	...	18,900

space obviously represents a vacuum. Both ends of tube and cylinder are held together by duraluminum blocks and rods. For convenient handling the blocks are topped with heat insulating material.

The Steiner viscosimeter is made in two types, one being a laboratory model whereas the other is intended for the sales engineer and is strictly portable. These two types are shown in Fig. 1. Both types are held by a cardan joint in order to insure a perfectly vertical position of the tube when carrying out the determination. For laboratory use, the cardan joint is securely fastened to a cast iron base.

As mentioned above, the actual Steiner test consists in measuring the time consumed during the rise of an air bubble in the tested oil. For that purpose, one of the plugs is tightened and the sample poured from the opposite direction into the tube by using a small funnel. The tube is filled to about ½ or ¾ in. of the top. The other glass plug is then inserted and the instrument turned so as to permit a slow rise of the air bubble through the sample of oil. The time of travel between the marks "0" and "2" is determined by means of a stop watch to decimal fractions of a second. The moment of passing the marks is noted by scrupulously observing the upper meniscus of the air bubble. The distance of travel is 100 mm. (3 15/16 in.).

In case of testing very dark fuel oils, the writer applies an electric light in back of the viscosimeter, which makes the readings more convenient and precise. Temperature readings on the precision thermometer (attached to the measuring tube) are taken before and after the test, and the averages of both are recorded together with the Steiner seconds. This procedure enables the operator also to determine directly the kinematic viscosity in centistokes, which unit was adopted and recommended as a physically definable one at the 1933 World's Petroleum Congress in London.

Table II

Viscosity Tests at Various Temperatures Conducted with No. 6 Fuel Oil by Means of the Steiner Viscometer Average Outside Temperature Equalled 76.4 Deg. F.

Average Temperature of Oil in Deg. F.	Observed Viscosity in Steiner Seconds	Centistokes
171.6	4.8	24
160.9	5.1	26
150.0	5.6	28
145.3	5.8	29
140.9	6.0	30
137.8	6.3	32
134.6	6.9	35
131.4	7.2	37
129.3	8.0	41
128.0	8.3	42
126.1	8.6	44
123.7	9.1	46
122.1	9.5	48
120.7	10.2	52
118.0	10.8	55
115.6	11.3	57
112.6	12.4	63
111.0	13.0	66
109.3	13.6	69
107.8	14.1	72
105.1	15.9	81
103.4	17.2	87
102.9	17.4	88
101.2	18.4	93
100.2	18.8	95
99.9	19.2	97
98.4	20.3	103
95.6	26.0	132
90.0	29.1	148
85.3	36.5	185
78.3	50.5	256

However, conversion tables and diagrams are furnished with the viscosimeter so that viscosity may readily be reported in Saybolt or Redwood seconds or in Engler degrees. Viscosity tests may be made by means of the standard instrument at temperatures ranging from 60 to 210 deg., but there exist instruments of the same principle for tests outside of this range. The total length of the standard apparatus is 12¼ in.—excluding the stand—and the weight of the viscosimeter without the stand and without the sample of oil, but with the glycerine filling, is 1 lb. and 7 oz.

In order to illustrate a complete set of viscosity determinations, the author has tested three grades of industrial fuel oils, conforming to Nos. 3, 5 and 6 gravity ranges. About fifty individual determinations were made with each of the three samples. Excerpts from the complete set of values for the No. 6 oil are shown in Table 2. This oil is very dark brown, has a gravity of 12 deg. Bé., flash point 300 deg. F., 320 deg. F. fire point, a calorific value of 18,650 B.t.u. per lb. and viscosity at 100 deg. F. by the Universal Saybolt test of 525 seconds. A discussion of the observed values is offered in the following paragraphs.

Viscosity Curves Criteria for Uniformity

According to a technical definition, viscosity curves are diagrammatic representations of numerical viscosity values at various temperatures. Their accuracy de-

pends therefore on the analytical dexterity of the testing engineer, as well as on the characteristics of the devices employed for the determinations. From the latter viewpoint, the new viscosimeter should be a distinct step toward greater precision in applied viscosimetry. With just a little care in conducting the individual tests, the results check within ± 0.5 per cent or even less divergency. This brings viscosity curves plotted by the new method to such a degree of reliability that they may serve as actual criteria for the uniformity of fuel oils and other viscous fluids, or as basis of specifications for the most important branches of metallurgical and machinery industries.

Reliable viscosity curves have also added considerably to the theoretical aspect of the relationship between viscosity numerals and temperatures. During his fundamental research work on oils of mineral origin, Steiner developed the following formula for viscosity curves:

$$\text{loglog}\ (V_k + c) = A - B \log T$$

where V_k is the kinematic viscosity in centistokes, T is the absolute temperature in deg. C., A and B are constants, and c is a constant, approximately equal to 0.8.

While the above expression has been the outcome of speculative endeavor, actual measurements of viscosities at various temperatures have confirmed the correctness of Steiner's deductions. Thus, a geometrical transformation of ordinary coordinates of viscosity diagrams into a loglog field should give theoretically straight lines as ideal viscosity curves. To what extent this is true for fuel oils may best be comprehended from a comparison of the three test series conducted by the writer. The ordinary viscosity curves for the three oils reproduced in Fig. 2 have been replotted in the loglog field as shown in Fig. 3. Practically straight lines may be noted in this latter diagram, thereby confirming the above statement.

Very pure fuel oils and mineral oils in general approach straight lines when plotted in a loglog field. Mixtures of two or more oils as well as impure oils disclose invariably loglog viscosity curves somewhat curved. Dilution by light hydrocarbons produces viscosity curves, which are precisely parallel to those of the undiluted oil. This means that the percentual dilution may directly be ascertained from a comparison of viscosity curves of the original oil with that of the diluted oil containing a definite (i.e., experimentally added) amount of the diluant. It is obvious that the viscosity curves of diluted oils are always lower than that of undiluted oil of the same grade. A detailed discussion of the practical effects of lower viscosity upon burner efficiency of metallurgical furnaces is outside the scope of this paper.

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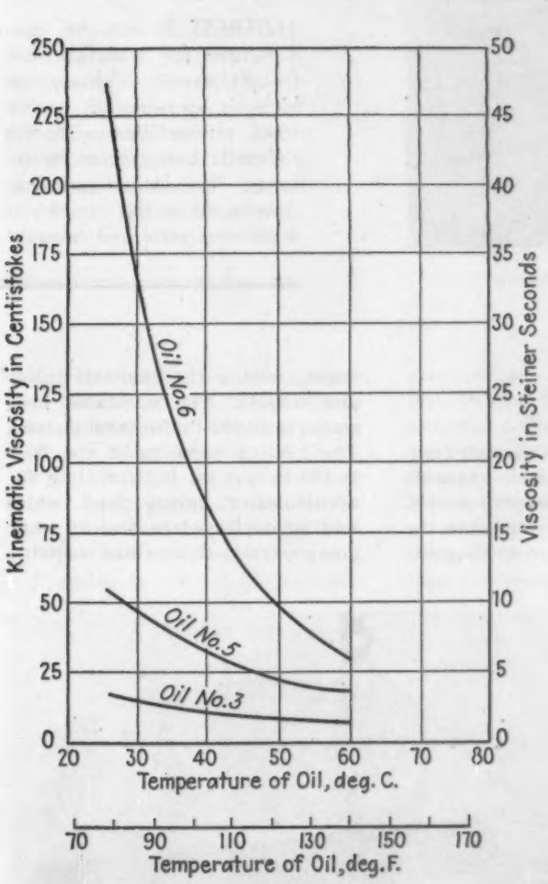
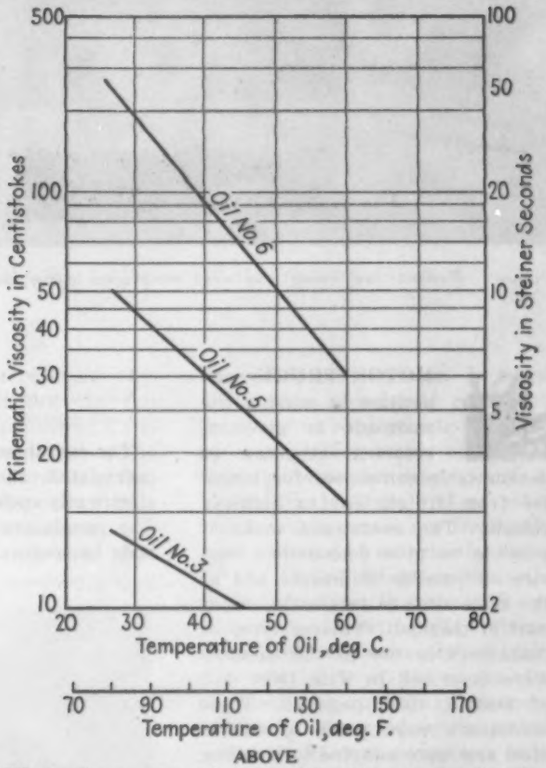


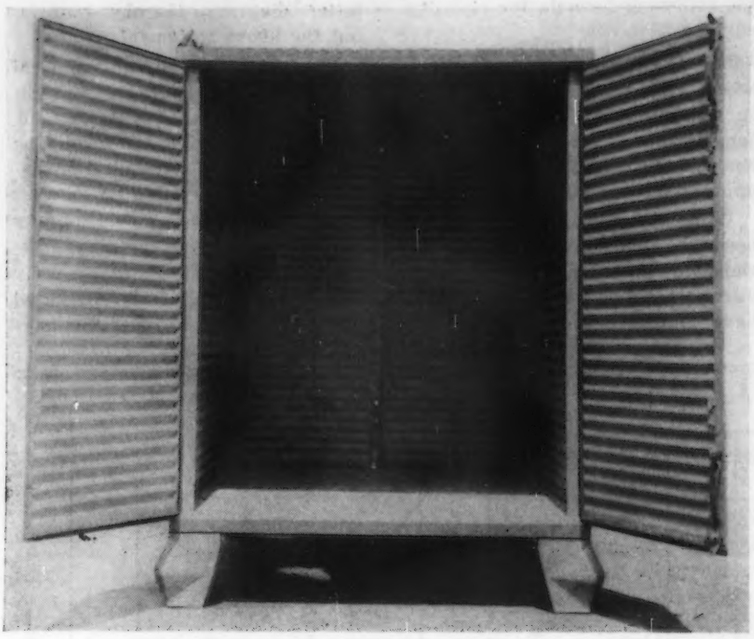


ABOVE

FIG. 3—The experimental curves of Fig. 2 have been replotted here in a loglog field. These straight lines validate Steiner's theoretical viscosity formula.

AT LEFT

FIG. 2—Actual viscosity curves for Nos. 3, 5 and 6 fuel oils, which oils are generally used for firing the metallurgical furnaces of leading steel plants. These curves are obtained from measurements with a Steiner viscometer.



Rustless steel freight container introduced in the United States.

Freight Here and

INTEREST in freight containers for transfer from freight car to highway vehicle is growing as motor truck competition with the railroads becomes more intense. The latest container developed in this country is a stainless steel unit brought

MOTOR TRUCK competition is causing the railroads to give increasing attention to demountable containers for transfer from freight car to highway vehicle. The containers make it possible to give door-to-door service on smaller shipments and at the same time to retain the major part of the haul. Various types of containers in use in this country were described in THE IRON AGE of Dec. 6, 1934, page 45. These containers were made of carbon steel and were adapted to handling by crane or by means of castors or skids.

To demonstrate the use of stainless steel for light-weight containers the Rustless Iron Corpn. of America, Baltimore, recently built a container unit of RR-11 rustless steel, a metal containing upward of 11 per cent of chromium and from 0.05 to 0.07 per cent carbon. The container is recommended particularly for its saving in weight as compared with units built of conventional materials. It has a total weight of 1300 lb., of which 1105 lb. represents the alloy steel used and 195 lb. a wood floor. The dimensions are as follows:

Outside overall—7 ft. 2½ in. wide, 9 ft. 3⅜ in. long, 9 ft. 4$\frac{1}{16}$ in. high.

Inside overall—6 ft. 7½ in. wide, 8 ft. 3⅞ in. long, 7 ft. 5¼ in. high.

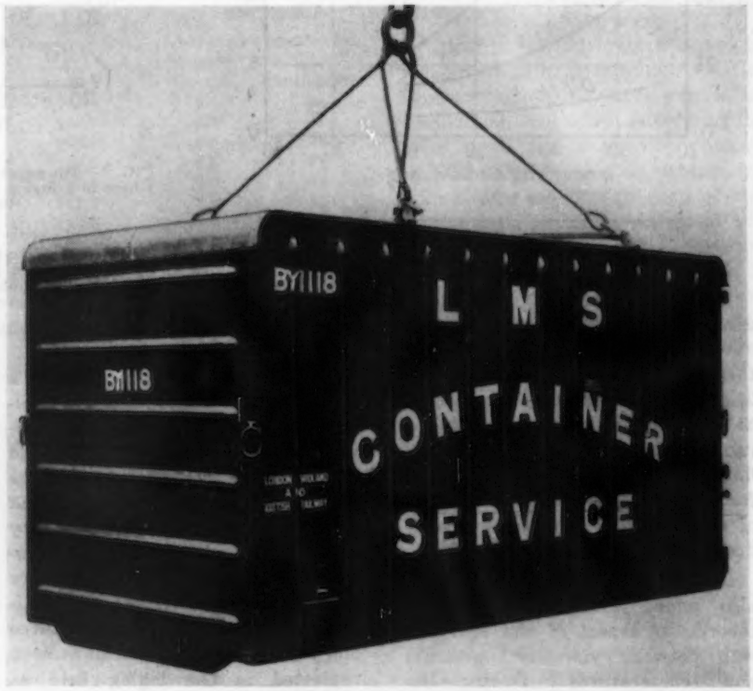
Opening opposite ends—6 ft. 7½ in. wide, 7 ft. 2¼ in. high.

Double door at each end.

Volume capacity—428½ cu. ft.

Load capacity—9000 lb.

The container is fabricated from corrugated sheets and channels electrically spot welded into panels. The panels are assembled into the body by continuous arc welding the edges, joining the channels inside and outside. The calculated fiber stress is 40,000 lb. for 9000-lb. load. The loading capacity of the floor is 160 lb. per sq. ft., providing for accumulative spring load which will be developed in transit while going over crossings and switches



Steel container, timber lined, with fluted sides and ends, used on London Midland & Scottish Railway. Load capacity, 4 tons.

Containers Abroad

out by the Rustless Iron Corpn. of America. In Europe and especially in Great Britain, the use of freight containers is much more widespread than in this country. A brief resumé of British experience with containers is given here.

Locomotive crane transferring a freight container from freight car to platform wagon.

and when hauling by truck when the container is resting on legs in a loaded condition. The side panels have a loading capacity of 55 lb. per sq. ft., this load on the side panel being equal to an inertia force of container load accelerated or retarded at 13 ft. per sec.

Progress in the use of demountable freight containers has been more rapid abroad than in this country. Although the use of stainless steel has not been reported in foreign countries, duralumin has been employed for the construction of containers in Germany and in France. In most countries, however, the materials commonly used are carbon steel or wood. In Great Britain the transfer of containers from car to road vehicle is chiefly by crane. The number of stations equipped with stationary cranes is comparatively large and at other points mobile cranes are frequently used. The use of automobile cranes in the United Kingdom is facilitated by the fact that the rails are sunk flush at most freight stations, permitting easy movement of highway vehicles across the tracks. On the Continent, containers are more commonly equipped with swivel wheels or castors, sometimes with arrangements for suppressing the wheel gear when loaded on freight cars, or are moved by rollers.

Another steel container in use in Great Britain.

Containers have come into most general use in the British Isles, where they were introduced before the war. The British railroads now have close to 10,000 containers in operation. At first the containers were built entirely of wood, but later all-steel construction was adopted with a view of increasing strength, resistance to shock and durability.

One reason for the wide vogue of containers in Britain is that the four large railroad companies have operated door-to-door and motor transport services for a considerable period. The container reduces total transportation costs because the railroads themselves handle the

(CONTINUED ON PAGE 90)

Tomorrow's Machine Tools

By GUY HUBBARD

Engineer, Cone Automatic Machine Co.

ALTHOUGH I am proud of the fact that I always have been in some way associated with the machine tool industry, as has my family over a period of more than 100 years, I lay no claim to prophetic powers—being neither the seventh son of a seventh son nor a crystal gazer. It has been said by someone that the discussion of history is a fairly safe pastime, as also is indulgence in prophecy—provided that in the first case the historian delves far enough into the past to be sure that no one else knows the real facts, and in the second case that he project himself so far into the future that neither he nor any of his audience will be on earth when and if the prophecies materialize.

In this paper I am going to deal with matters which are close to us—practical matters in which we as practical builders and practical users of machine tools are vitally interested. Basing it on 25 years of close observation of the machine tool building and using industries, and time and its economic tides which affect the metalworking industries, I say emphatically and with firm conviction: "Gentlemen—tomorrow's machine tools are with us today!"

When I make this statement I refer to the machine tools exhibited at the Machine Tool Show of 1935, and by "tomorrow" I mean a period of about five years to come—which will be the working life of many of the high production machines if they are pushed to their productive limit, as many of them are destined to be. We now are stepping over an imaginary line between a period of economic depression and intense technical stimulation, into what we hope and expect will be a period of intensive production during which engineering brains will, for a considerable period, be switched from the problems of inventing improved machine tools to the problems of manufacturing these improved machines in large numbers and in tooling them up to meet the needs of a rising tide of users who already have begun to demand this service in no uncertain way.

Machines Have Power and Speed to Meet Future Demands

What does all this mean to the prospective purchasers of machine tools? It means that they can buy the new machines which have been demonstrated at the Cleveland Show with reasonable assurance that they are not untried experiments, that they will not be outmoded next year or even within their fair economic life, and that they have built into them such a reserve of power and speed and rigidity that the cutting tools of tomorrow—even though they be hard as diamonds and of toughness now unknown—can be made to perform capably in them. In other words, these machines are capable of being retooled to meet conditions of cutting tools and products far beyond anything with which we now have to contend.

What does all this mean to machine tool builders? It means that after five of the most difficult, expensive and brain-wearying years through which the industry ever has passed there is at hand an economic and engineering "breathing spell" during which—through revived activity in machine tool building and machine tool sales—this basic industry is about to reap at least some of the reward which it so richly deserves.

Changes Will Affect Tools and Accessories

Not that there will be no further progress in machine tool design—not that there will be no progress in manufacturing technique within the next five years. There will be, but it is destined to affect tools, attachments and accessories more than it will the "foundation machine tools," if I may coin a phrase. Nor are engineers going to be thrown out of work. Rather, there will not be enough good ones available and the field of the available good ones who have weathered the depression with undimmed powers will be broadened greatly into the realms of production engineering, and service and sales engineering. The machine tools of tomorrow are not going to sell themselves—at least not for a while yet—and they most certainly are going to be the most difficult machines to build in quantities of any in the industrial history of the world. If I see visions, they certainly are not of engineers or any others in the machine tool industry taking their breathing spell lying down. It will be simply as a readjustment of activities within the industry.

Machine Tool Industry To Become One of Its Own Good Customers

Tomorrow's machine tools may be here today, but I am not at all sure that the machine tool plant of tomorrow is with us yet. At any rate, it is not common. While it may be unkind to bring up the old adage to the effect that "Shoemaker's children often go barefoot," it is a fact that when the machine tools of to-

Are With Us Today

THERE will be further progress in machine tool design and in manufacturing technique within the next five years, but it is destined to affect tools, attachments, and accessories more than it will the "foundation machine tools," states Mr. Hubbard in this paper, which was presented at a session of the Machine Tool Congress, held Sept. 17, under the direction of the Cleveland Engineering Society. After five of the most difficult years that the machine tool industry has ever known there is at hand an economic and engineering breathing spell through revived activity in machine tool building and sales.

morrow are demanded in large numbers no machine tool builder will have a tool room large enough to permit of their continued manufacture therein. Machine tools are going to be manufactured in shops where the equipment and shop practice are wholly different from what they were in the 1920-1930 decade. The finest of the equipment which machine tool builders now are offering to other industries will have to be applied to the machine tool industry itself. Gaging and measuring systems which formerly were confined to the inner sanctum of the tool or experimental room must come forth into the big shop. The big shop may even have to be air-conditioned, not simply to promote the comfort and efficiency of the workmen (as already is the case in some fine plants), but to that finer degree necessary to maintain the constant accuracy of gages and measuring instruments working to limits better expressed in multiples of millionths of the inch than in subdivisions of thousandths. The machine tool plant of tomorrow really will be a huge mechanical laboratory in the equipping of which every builder of fine machines is going to play a part. In other words, the machine tool industry must be one of its own good customers—and that very soon.

Building of Master Tools Still to Require Skilled Workmen

Regardless of the quality of the manufacturing equipment with which machine tool builders provide themselves, the master tools of industry will continue to be "built" rather than "manufactured," because into these "machines which build machines" there has to be built something of the accuracy, the skill and even of the intelligence of the engineers and artisans who conceive and create them. With automatic operation, automatic gaging and self-adjustment of production tools as common as such features now are, the possibility that the machine tools of tomorrow can be built successfully by unskilled workmen is out of the question. It is a peculiar fact that the more the machine tool industry does to make possible the use of relatively unskilled workmen in other industries, the greater becomes the need for very highly skilled men within the machine tool industry itself. There can be but one answer—the machine tools of tomorrow are destined very soon to be built by the apprentices of today. It behooves the machine tool industry, therefore, immediately to revive and thoroughly to overhaul its apprenticeship system to meet what is coming, and to make the industry attractive enough to trained men so that they will not drift out of it.

Machine Tool Plant Expansion Unlikely

Speaking of plants, so many machine tool builders were caught by overexpansion at the close of the war and upon the collapse of the 1929 boom that it will be some time before there is much activity of plant building in this industry. Rather, as business expands, remarkable things will be done in existing plants to push up the production of the machine tools of tomorrow on the floor space now available. The use of new machine tools in machine tool plants will help very materially as it is faster and more compact. The use of more and better materials handling and storage equipment likewise will play an important part. Beyond this, however, I see the widening use of parts and sub-assemblies made by outside specialists as taking a major load off the builders of the machine tools of tomorrow, still further postponing the day of plant expansion. Not only will bearings of superlative grade be furnished by outside specialists, but the same will be true far more than at the moment of coolant and lubricating systems; feed works, both mechanical and hydraulic; mechanical, hydraulic and electrical controls; chucks and collets; and even such major elements as spindles, gears and gear sets, and main frames—particularly if the latter be fabricated by welding.

No Breathing Spell in Tooling-Up

Granted that we now will have a "breathing spell" in machine tool design, it is equally certain that we will not have a breathing spell in the realm of the tooling-up of the machine tools of tomorrow. One of the greatest lessons of the Machine Tool Show of 1935 is that there are today at least three effective but very different ways to do the common run of machining operations. If there is one best way to do a job, the advocates of the other methods certainly are not going to admit it until they have exhausted their last bit of skill and ingenuity in making theirs the one best method through improved tooling of the machine tools of tomorrow, which—as I previously have stressed—have been designed to handle effectively tools and work way beyond those of the moment. This "battle of methods"

(CONTINUED ON PAGE 81)

Calorizing Process Is Improved

By J. B. NEALEY
American Gas Association

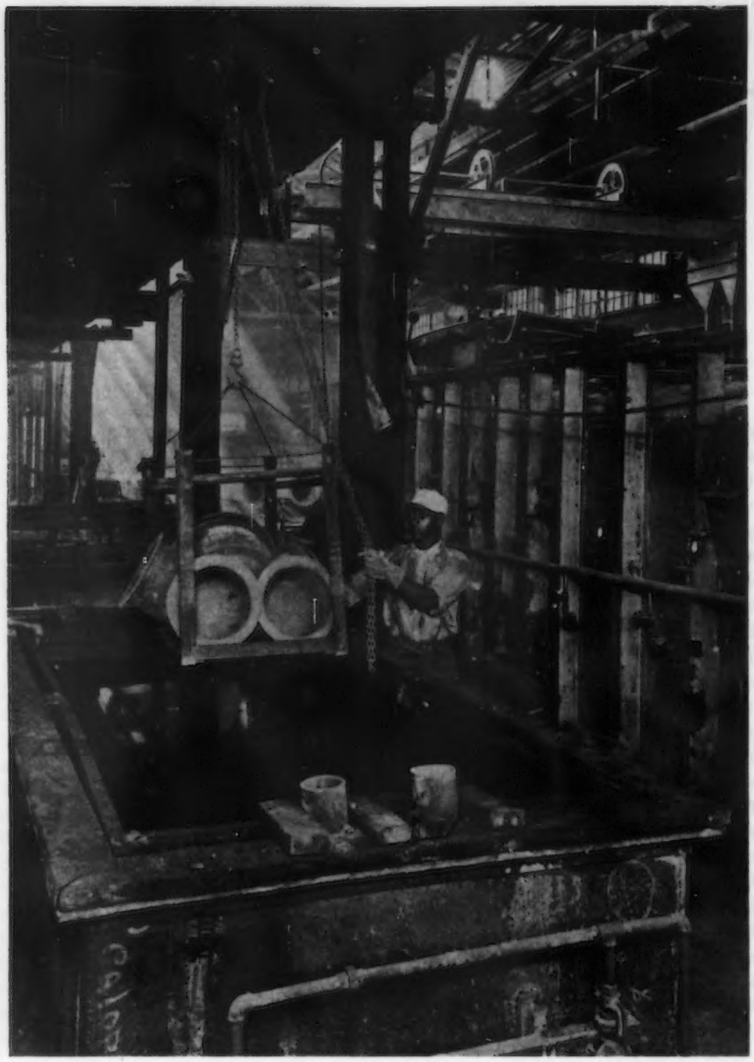


FIG. 1—Miscellaneous parts are pickled prior to calorizing, and this type of lead-lined wooden pickle tank is used. A unique feature is the heating equipment which employs gas burners firing directly into lead pipe coils submerged in the acid bath.

CALORIZING, as is well known, is a process whereby aluminum is driven into the surface of another metal, usually mild steel, to form an aluminum alloy. This alloy, where mild steel is the base metal, is practically immune to oxidation up to a maximum temperature of 1650 deg. F. for continuous work and up to 1800 deg. F. for intermittent work. Calorized steel will also withstand many corrosive elements such as high-sulphur and combustion products and oil, and is in demand for oil still tubes, air heater tubes, gas burners, annealing pots, carburizing pots, pyrometer tubes, bolts and nuts and many miscellaneous items.

Recent research has materially improved the process of calorizing. Flaking of the coat is eliminated, as this new process produces a very tough, iron-aluminum alloy, harder than the toughest tool steel. In fact, so effective is this new calorizing process that thin steel may be completely converted to iron-aluminum alloy, if desired, though surface conversion to a depth of 0.030 in. to 0.060 in. has been found very effective for most installations.

The Calorizing Co., Wilkinsburg, Pa., has a large plant for processing all kinds of work, chiefly pipe, tubes and fittings. For pipe the new process is as follows:

(1) The pipe and calorizing mixture are sealed in steel retorts 26 to 35 ft. in length and 26 in. in diameter with a wall thickness of 1½ in. The retort is then charged into a gas-fired furnace, where it is revolved while being heated to temperatures of 1500 deg. to 1800 deg. F.

(2) The pipe is then removed and cleaned in a tank of boiling water heated with gas burners.

(3) It is resealed in a retort and reheated in another gas-fired furnace.

(4) It is finally straightened, sized and ground on the ends.

There are five calorizing furnaces of brick and steel construction, with the roof arches in sections so that they can be removed by crane and hoist for loading and unloading. These furnaces are 5

ft. square in cross-section and they are made up of sections so that each furnace may be built to any desired length. Each section is 3 to 5 ft. long and is built in a steel frame so that it can be easily moved by crane. The portable roof arches fit on to these sections. Each section is provided with two to four gas burners and when a furnace is made up all the burners are coupled to a main supply line. The retort extends beyond both ends of the furnace, each end being mounted on a pair of rollers, one pair of which is rotated by motor to revolve the retort.

Pots and other items which, due to their shape, cannot be put into retorts are sealed in large steel boxes and charged into a car-bottom type furnace. There are two of these furnaces, one being 10 x 32 x 8 ft. high, fired with 42 gas burners. These burners are divided between the two sides and half of them fire tangentially to the roof while the rest fire between the piers on the car top supporting the boxes. The other furnace is 5 x 12 x 8 ft. high and is heated with 12 gas burners similarly arranged.

Miscellaneous parts are pickled prior to calorizing and for this work there is a lead-lined wooden tank 5 x 12 ft. x 3 ft. deep. The heating of this tank is unique in that use is made of four gas burners which fire into lead pipe immersion coils. Lead pipe 4 in. in diameter is used and extends the entire length of the tank, where it turns up with an elbow to form a vertical stack. The pipes extend through the tank wall so that the gas burners fire into them from the outside. They are placed ¾ in. above the tank floor on lead supports, so as to insure circulation below. Wood grates protect them from the heavy work.

A 6 per cent sulphuric acid solution is used at 180 deg. F. Originally steam was employed but this diluted the solution and caused serious variations in the pickling operation. Gas burners were then adopted, the new immersion system materially reducing gas consumption. The work is handled in and out of the tank with a crane and hoist. Immersion gas burners are also employed to heat the water in the cleaning tank, which is 5 x 45 ft. and 30 in. in depth.

Dip calorizing equipment is provided for treating work which requires a bright coat of pure aluminum. This process is similar to hot-dip galvanizing. A 24-in. x 24-in. x 10-ft.-6-in. cast iron pot carries the aluminum bath. It is heated by gas burners located underneath. Two pipes and gas burners, similar to those previously described, heat this tank. They are located at diametrically opposite corners of the pot.

There is a large foundry in connection with this plant where heat-enduring and corrosion-resisting stainless steel castings are made. These products are known as Calite alloys and include seven or eight different analyses. Core baking and mold drying is accomplished with gas fuel.

A fully equipped laboratory is maintained on research work and routine analysis. For the past three years an extensive research program has been conducted for the Calorizing Co., under the direction of Dr. C. L. Clark and Prof. A. H. White, University of Michigan.

FIG. 2—A gas fired calorizing furnace with retort in place and last section of the top being lowered in place

Safety Goes Back to the Foreman

By WILLIAM S. KNUDSEN

Executive Vice-President, General Motors Corpn., Detroit

IT would seem, from looking over accident statistics, that one of the safest places to be is at work in a factory. This is partly due to improved machine and tool design, but mostly due to education among workmen and foremen.

No doubt the prime mover in much of this improvement has been the safety engineer or safety man, as he is usually called. In the smaller concerns the responsibility for safety frequently falls upon an executive who has other duties. In larger units it is more common to employ a safety man, and it is interesting to note that in a recent survey it was found that the large units in manufacturing had the best records in frequency and severity.

It is regrettable that both frequency and severity of occupational injury got a little worse in 1934. From our own experience, we know that during 1934 we employed large numbers of men who were never before employed in the automobile industry, and it was only to be expected that with the rapid introduction of large numbers of inexperienced workers, industry would have unfavorable experience in accidents, tool breakage and damaged work.

Most of the training job of this large group of new workers is behind us, and the results at the end of this year are going to show that much, if not all, of the ground lost in 1934 has been recovered, and we know that other industries share our convictions in this regard.

The conveyor, so often pointed to as an instrument for speeding up work, which it is not, has perhaps been the greatest means for establishing order in plants and has been the means of keeping work off the floor, in this way preventing an untold number of accidents due to disorder—for which the old-time shop was famous. Occupational accident statistics now show that accidents from stepping on or striking objects amount to only about 5 per cent of the total accidents in manufacturing.

Conveyor Not a Pacemaker

When looked upon as a beast of burden, a sort of continuous truck line if you please, the conveyor is placed correctly. When, however, it is pictured as a means of speeding up work, it is incorrectly placed. For anyone connected with manufacturing in quantities knows that speed as such produces no increase in output. Only quality and accuracy of the operations on individual units produce an increase in the output of the assembly conveyor.

Early conveyors were rather crude affairs, and many accidents were due to parts dropping in the drive, or men getting caught in the chain. Happily most conveyors today are of the protected type, well enclosed, with safety links in case of jam, and the case of men getting

*Abstract of an address before the annual congress of the National Safety Council in Louisville, Ky., on Oct. 14, 1935.

hurt on conveyors is practically unknown. Furthermore, since a large single cause of accidents in industrial employment is "handling objects," it is evident that to the extent to which we can turn this kind of work over to the conveyor, we make rapid strides in reducing accidents.

Fixtures for both vertical and horizontal machines show substantial progress from a safety standpoint. Cam locking devices and box fixtures and dies of the sub-press variety with guide pins have not only eased the work of setting up and running, but also, have improved operating safety to such an extent that minor cuts and bruises represent the major part of accidents on that kind of work. Incidentally, cuts, lacerations, bruises and contusions account for about 49 per cent of occupational accidents.

Enforced use of goggles and automatic trip-off on presses with safety control have probably been the biggest discounts to bad accidents, which formerly ranked high both in severity and frequency. In fact, today about 95 per cent of the injuries are temporary disabilities, with only 1 per cent fatal or resulting in permanent total disability.

A new hazard has in recent years been introduced into factory operations by the increase of electrical tools, supplementing air tools in many instances, and necessitating general power-wiring installations in shops. While there were some careless installations in the early days of the adoption of electricity for welding, heating and operating purposes, in the main the number of burns have been small and the progress great. The greatest benefit in installations of this kind is to have as near as possible a standard hook-up throughout the plant and to have wiring or busbars and switches of the latest approved style. Much credit should be given manufacturers of this style of equipment for the orderly progress made, and for the standardization of their product. Today occupational injuries from use of electricity in manufacturing are quite low.

Fume and Dust Hazards

Another hazard which has come to the front in recent years, and has had to have the attention of all of us, is the question of elimination of fumes, paint spray, acid fumes and dust which modern processing brought in. Early installations showed a lack of knowledge of the problems to be met and the inadequacy of the equipment developed up to that time, with a resulting detriment to the health of the operators. We are happy to say, however, that due to hearty cooperation by engineers, men of science and equipment manufacturers, there is today hardly a single problem of ventilation of this sort which cannot be handled so that the operator's health is fully safeguarded, and dangers of fire or explosion eliminated.

THE foreman's interest is the all-important factor in eliminating accidents, says Mr. Knudsen. To be safety conscious is going a long way toward being quality conscious, and quality is what factories grow on. Conveyors have prevented an untold number of accidents, as have the enforced use of goggles and automatic trip-off on presses with safety control.

Hazards arising from use of electrical tools and of paint spray, acid fumes and dust have largely been eliminated.

We do not by any means pretend to claim that manufacturers have gone all the route in getting foolproof devices, but substantial improvement has been made and safety engineers are constantly working on new wrinkles to reduce further both the frequency and severity of accidents. By and large, the mechanics of the safety problem in factories can be said to have made substantial progress, and is on the way to more progress. Manufacturers realize that the workman, unaffected by fears for his own safety and unaffected by the shock of injury to a fellow workman, is a better workman, and will produce better quality in his day's work.

Safety education of workmen, or accident prevention work through the medium of education, has made its best progress through so-called campaigns for accident prevention which most progressive factories inaugurate from time to time. The prime formula for success in this kind of work is to get the foreman really enthusiastic about the standing of his department over a period, with the result that measures taken to accomplish the objective become a permanent feature and in this way improve the situation for all time.

Aside from safety campaigns, one of the important things to do is for the foreman or the job setter to give a new man a good, thorough explanation of the hazards of his machine, along with a careful course of instruction in the machine's operation before he is put to work. Altogether too many accidents have been due to faulty or insufficient instruction of new men when everybody is busy and output is behind.

My personal opinion is that the American workman does not require pushing or speeding up. When he has thoroughly learned the quality part of his job and fully understands the requirements in the piece he is producing, he himself will take care of the speed part of it, and he naturally resents any charges of being slow.

We have found in the corporation that the foreman's interest in the safety problem is the all-important factor in getting rid of accidents of all kinds, severe or trivial.

Human Salvage the Keynote

In recent visits to many of our plants, after the finish of our last safety campaign, we talked to department heads. The plaques presented for best results were received politely. The frequency and severity standings in the particular campaign were received as a matter of course, but when the saving of fingers, eyes or lives was explained as being the direct result of the improved standing, this made a profound impression and was the real good the campaign had produced.

Figures are figures. Some people like them, some hate them, but in safety work if you can convince foremen that they have actually been the means of saving lives, eyes, limbs or fingers, then your safety work is under way to a real start.

When the foreman has become thoroughly interested, the men automatically become interested. The older and more experienced begin to look after the younger men

(CONTINUED ON PAGE 81)

Late Returns from Laboratory And Mill

By T. W. LIPPERT
The Iron Age, New York

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AN oxy-acetylene flame is used with an automatic machine developed by Gleason to harden gear teeth quickly and effectively.

An English firm has produced a mixer for oxy-acetylene and coal gas. The flame so produced is "softer" and less hot than ordinary oxy-acetylene.

A new die casting alloy and a new metallic resistor alloy are being marketed by companies in this country.

A process and analysis patent has been taken out in Germany on a copper-nickel-iron magnet alloy.

The International Tin Committee announces a new cleaner for tinned ware which dissolves much less tin than ordinary alkaline solutions.

Starbright is the name of salts marketed in England for bright nickel plating baths.

Data are given on the thermal efficiency of Ferro-Therm, heat insulator made from ordinary black steel sheets.

The use of aluminum instead of silver for mirrors is described.

o o o

Gear Teeth Flame Hardened

THE idea of surface hardening with an oxy-acetylene flame long antedates A. E. Shorter's experiments in England, but to Shorter belongs the credit for mechanizing and standardizing the process. Principally because of his work, the flame hardening technique was revived for all classes of work and is showing indications of becoming standard practice in many machinery and heat-treating plants. How the Shorter process is being adapted to all types of iron and steel products was described in detail for the first time in THE IRON AGE of Aug. 8.

Experiments on gear hardening with flames have not been confined to England, for the Gleason Works in this country has designed an automatic machine which has been in service in its plant for well over a year. This machine is now being offered for sale under the protection of patents pending both here and abroad. The Gleason gear hardening machine employs two burners which heat the tooth on both sides simultaneously, thus obviating any likelihood of twisting, distortion or checking of the tooth. Also, the hardening is naturally accomplished much faster than with machines using only a single blowpipe.

As shown in Fig. 1, each of the torches is followed by a jet of water for immediate quenching. Thus a hard surface is obtained even though the body of the gear is unchanged, and there is no time for distortion to set in. This last factor is particularly important, since a uniform bearing on all teeth is most desirable from a wear standpoint. The operation of the machine is entirely mechanical (other than indexing), thus eliminating the human factor. The hydraulic control is flexible, permitting variable speed of travel which provides for uniform heating on a section of variable thickness (such as a bevel gear tooth) and for speeding up at both ends to prevent burning of the corners.

The recommended steel for a casting or forging is SAE-6145 for great strength or a 1.25 manganese 0.35 per cent carbon steel for ordinary purposes. A Brinell of about 475 on the hardened surface is obtainable. The penetration of the wearing surface can be varied at will by changing the speed of travel of the blowpipe.

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Three New Alloys

A NEW alloy containing copper, zinc and silicon is being offered by Doehler Die Casting Co. under the trade name Doler-Brass. Particularly adapted to the die casting process, this new alloy has a fine light yellow finish when cast, a tensile strength as high as 75,000 lb. per sq. in., a yield point of 40,000 lb. per sq. in., 20 to 25 per cent elongation in 2 in., 20 to 25 per cent reduction in area, a Brinell hardness of 110 to 120 (500 kg.) and an impact strength of 30 to 36 ft. lb.

Longer life, lower cost and higher temperature operation than with nickel-chromium is claimed for a new electrical-resistor alloy called Kanthal, which is marketed by the C. O. Jelliff Mfg. Corpn., Southport, Conn. This metallic element has a much higher specific resistance (35 to 40 per cent) and lower specific gravity (10 to 15 per cent) than nickel-chrome alloys. It is particularly free from attack in the presence of sulphur. Two grades of Kanthal are available, viz., A-1 for operation in furnaces of 2460 deg. F. maximum temperature, and D for operations up to 1150 deg. F. This latter temperature is in the range in which much nickel-chrome alloy is now used.

A 35 per cent nickel, 9 per cent copper (and remainder iron) alloy for use in magnetizable elements such as cores of transformers and field coils was patented recently by Simens & Halske Aktiengesellschaft, Germany. The patent does not cover the chemical analysis as thoroughly as it does the method of rolling. Reduction to the required thinness by a cold rolling process is accomplished by reducing the metal in cross-section by hammering or section rolling, with stressing of the metal on all sides in at least the last stages prior to the flat rolling into ribbon form. There is no heat treatment during the reduction. The material stressed on all sides shows a much higher initial permeability than material

rolled directly to ribbon in the usual manner.

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A Better Cleaner for Tinned Ware

LOSS of tin by chemical attack of the tin linings of the steel and copper vessels used in the dairy and other industries occurs almost entirely during the cleaning operations. A hot solution of sodium carbonate is usually used. However, the International Tin Research Council has shown that small amounts of sodium sulphite added to alkaline solutions cause a great reduction, actually to about one-tenth part, in the attack on tin coatings. Experimental determinations have shown that the beneficial effect of the sulphite is due to its power to react with the oxygen dissolved in the detergent solution. Experiments were carried out with concentrations of sodium carbonate or caustic soda similar to those normally used in cleaning operations and over a range of temperature from 40 to 100 deg. C. It was determined that, besides being the most efficacious agent for absorbing oxygen among the soluitons tried, sodium sulphite is inexpensive, relatively stable in the solid state and readily soluble in water and alkaline solutions. Further, its oxidation product, sodium sulphate, has no deleterious effects.

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A New Welding Flame

IN 1903 two pioneers of oxy-acetylene welding, Fouche and Picard, recognized that a mixture of coal gas, acetylene and oxygen had definite advantages over a mixture of acetylene and oxygen only. The inner cone of an oxy-acetylene flame, which is the part of the flame used for welding, has a temperature of about 6200 deg. F., which is unusually high. Since the melting point of iron is near 2730 deg. F. and it boils at near 4440 deg. F., it has been recognized by some that great benefit would accrue from the use of a flame with a somewhat lower temperature. By mixing coal gas with acetylene, before the acetylene is in turn mixed with oxygen, the flame temperature can be reduced to about 4710 deg. F. Allowing for heat losses that occur through radiation, the flame temperature drops below the boiling point of iron, but is still well above the melting point.

Although the early experimenters saw both the problem and the solution, they could not devise a satisfactory mixer for acetylene and coal gas. A slightly different arrangement to accomplish the same purpose was described in THE IRON AGE, July 11, under the heading of Oxy-Ferrolene. This is essentially ordinary coal gas impregnated with vapor of a patented liquid. The temperature of this flame is near 5000 deg. F.

FIG. 2—An oxy-acetylene coal-gas flame (above) compared with the smaller but hotter oxy-acetylene flame below.

However, a satisfactory mixer for coal gas and acetylene has just been placed on the market by Barimar, Ltd., welding engineers, of London. The mixer is known as the Sopromo, and is patented in England and other countries. Welds produced by this process are very pure, heat is localized, no bubbling occurs in the weld, and a close grain in the deposited metal is obtained. The comparatively soft flame spreads over the metal and minimizes oxidation. In Fig. 2 is shown the difference between the Barimar-Sopromo oxy-acetylene coal-gas flame and the ordinary oxy-acetylene flame. The illustration shows that not only is the outer cone of the Sopromo flame larger but it is also much "softer."

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An Addition to the Bright Nickel Family

EVER since its inception late in 1934, bright nickel has received increasing attention from electroplaters both here and abroad. The latest development of this nature has been dubbed Starbright by the owners, Coleman & Appleby, Ltd., England. Like the better known Schlotter process, the Starbright solution is made up by dissolving a quantity of salts (analysis is secret) in boiling water. The Ph value is adjusted with plastic nickel carbonate to the range 5.6 to 5.8. The solution is worked at 85 deg. F. and at 2 to 2½ volts. Heavy or light deposits can be produced

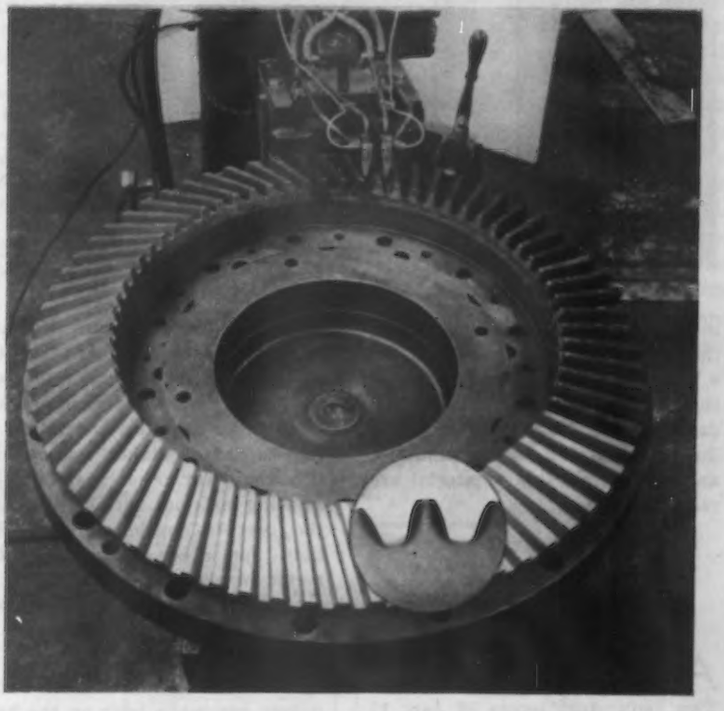

FIG. 1—The Gleason oxy-acetylene gear-hardening machine in operation. Both sides of a tooth are heated simultaneously, and quenching is accomplished by means of two small water streams directly back of the burners. The machine is entirely automatic. The gear teeth on the right have been hardened—note their darker color. The insert shows the hardened portion of a tooth.

depending on time and current density. The solution is suitable for brass, tin, iron and steel. Each gallon of water takes about 3 lb. of the salt.

The advantages of the Star-bright process are similar to that of bright nickel solutions in this country. The deposits are non-brittle and can stand chromium plating and are consequently as resistant to rusting as are present nickel deposits after chrome plating. The plate is so bright that in some classes of work the polishing process can be eliminated, whereas in all cases at least 75 per cent of the finishing can be avoided. Thus a larger output results because of the fewer finishing operations, damages resulting from handling during polishing are minimized, and costs of polishing material are reduced considerably.

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Heat Insulating With Steel Sheets

A LARGE new outlet for steel sheets was pointed out in THE IRON AGE, issues of Jan. 17 and Feb. 14, wherein it was shown that properly arranged steel sheets were preferable in many ways to cork and similar materials for heat insulation. A commercial product of this nature is being marketed by American Flange & Mfg. Co., Inc., New York, under the trade name of Ferro-Therm.

This metal insulation consists of parallel-spaced commercial black steel sheets having dull or non-bright surfaces; the sheets having low emission and high reflection values at the frequencies of radiant heat. The thin sheets of black steel are formed with angularly arranged surfaces; small ribs at the jointure of these surfaces increase the rigidity and thereby eliminate vibration. Thus, the propagation of sound waves is diminished, and improved insulating qualities are obtained. A cutout section of Ferro-Therm wall insulation is shown in Fig. 3. Such an insulation is said to have a higher heat insulation than any other standard insulating material, such as cork, and the cost is considerably smaller than for other materials. This metal insulation may be used in stoves, furnaces, refrigerators, refrigerator trucks, ships, cars, in cold storage buildings, etc.

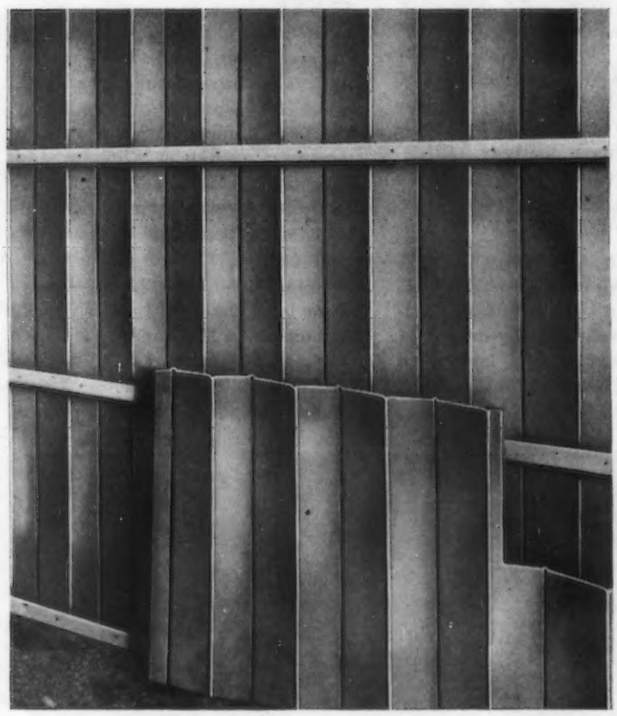

FIG. 3—New type of wall heat insulation made from parallel-spaced thin black steel sheets with inclosed air spaces. Heat conduction is less than for cork and other standard insulations, and initial cost is also less. Other advantages are no absorption of gases or moisture, high strength, permanency, light weight and compactness.

The Armour Institute of Technology has made tests on the heat conduction of a sheet of Ferro-Therm insulation measuring 16 by 16 in. This section of Ferro-Therm contained four steel sheets and, with inclosed air spaces, the entire thickness was 4 in. With a temperature of 46 deg. on one side, the other side had a temperature of 98.2 deg. The heat conductivity in B.t.u.'s per sq. ft. per deg. F. per one inch thickness was 0.226. This type of insulation avoids any adsorption or condensation of moisture, adsorption of gas, it resists decay and fungus growth, it is non-combustible and is light in weight, compact and strong.

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Aluminum Mirrors

SILVER has always been regarded as the standard metal for ordinary domestic and decorative mirrors, due mainly to the fact that it may be chemically deposited fairly easily; in addition, tarnishing is minimized by the use of heavy protective layers on the back of the mirror. However, where the silver must be exposed to the air, such as for astronomical mirrors, its use is very unsatisfactory.

The Metropolitan-Vickers Electrical Co., England, has perfected the evaporation process to such a point that high-class optical mirrors can be secured with ease. Aluminum has proved to be an admirable metal for the production of such mirrors and the results attained are astonishing. The surface is not only highly reflective, but it tarnishes very slowly in air and can be cleaned by the application of pure soap and water. Hence, the actual surface itself may be used in astronomical telescopes and for similar purposes. The process consists of heating a selected metal to its evaporation temperature, in vacuo, and causing it to condense on the surface which is to be covered.

The process has been used with great success for other metals as well as aluminum. Very fine films of copper, chromium, tin, silver and lead have been prepared, but, with the exception of the chromium, all must be protected from the attacks of tarnishing agents. By this method, aluminum has been deposited on fabrics, paper, bakelite and porcelain, and investigations are proceeding on the possibility of finding new applications for coated materials of this type. Now that the workshop problems have been solved, it seems probable that the evaporation process of coating surfaces may find use for protection or ornamentation, as well as for specific scientific purposes.

Resistance Process Applied To Welding Copper-Plated Steel Tubes

TWO interesting recent applications of resistance welding equipment are shown in the accompanying line sketches, which with the descriptive data were furnished by the Thomson-Gibb Electric Welding Co., Lynn, Mass.

The first machine, Fig. 1, is used to weld a double copper-plated steel tube which is part of an automobile fuel feed system. Welding the tubes in this way makes them easier to install and keeps them from rattling or chafing in position.

The machine consists of a pair of grooved welding wheels which rotate freely on their shafts and a fixture which pulls the tubes through the welding unit. The tubes, cut to length in advance, are held in a gage which starts the weld a fixed distance from the ends to allow slack for connecting. To make the weld, the operator simply steps on a treadle, which starts the cycle. When the correct length of weld is made, the current cuts off automatically and the machine returns to position ready for the next weld. This machine has no driving mechanism for the welding wheels and no current interrupting device. The tubes are pulled through the wheels by the fixture and the current remains on continuously from start to finish of the weld.

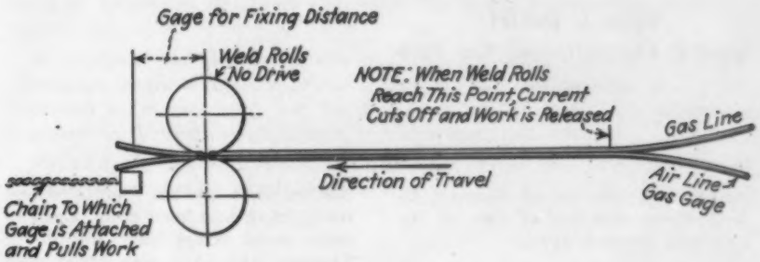


FIG. 1—Resistance welding machine for doubling up a pair of automobile fuel feed tubes. A fixture pulls the tubes, cut to length, through the welding unit.

Fig. 2 shows the other application, which is even more unusual because the welding transformer serves as a heating unit and does with far greater speed a job that was formerly handled in an electric furnace. The product is small copper-plated steel tube. The heating unit is linked with a forming machine which shapes the tube from flat strip steel.

The heating unit consists of two pairs of grooved wheels. One of each pair is insulated from its mounting; the other two are connected at the secondary terminals of the transformer. The wheels are arranged so that the distance between each pair can be altered to suit operating conditions. This arrangement, together with a current regulating switch, provides an infinite variety of adjustments to take care of changes in speed of the machine or size of the tubing.

As the tube leaves the forming machine it is pushed on through the heating unit by feeding rolls where the copper coating is melted and the steel fused into a tight joint. It was found that when the tube cooled in the open air, oxidation turned the outer surface almost black. By delivering it into a unique cooling chamber made of a length of ordinary merchant pipe heated by a small gas flame, the brazed tube emerged quite cool and bright and clean. This equipment can make ⅝-in. tube at the rate of 30 ft. per min.

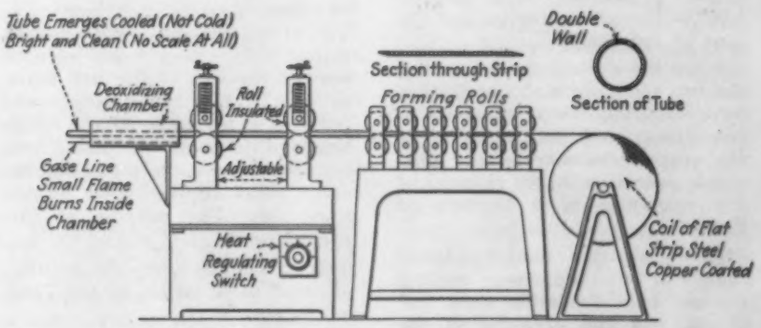
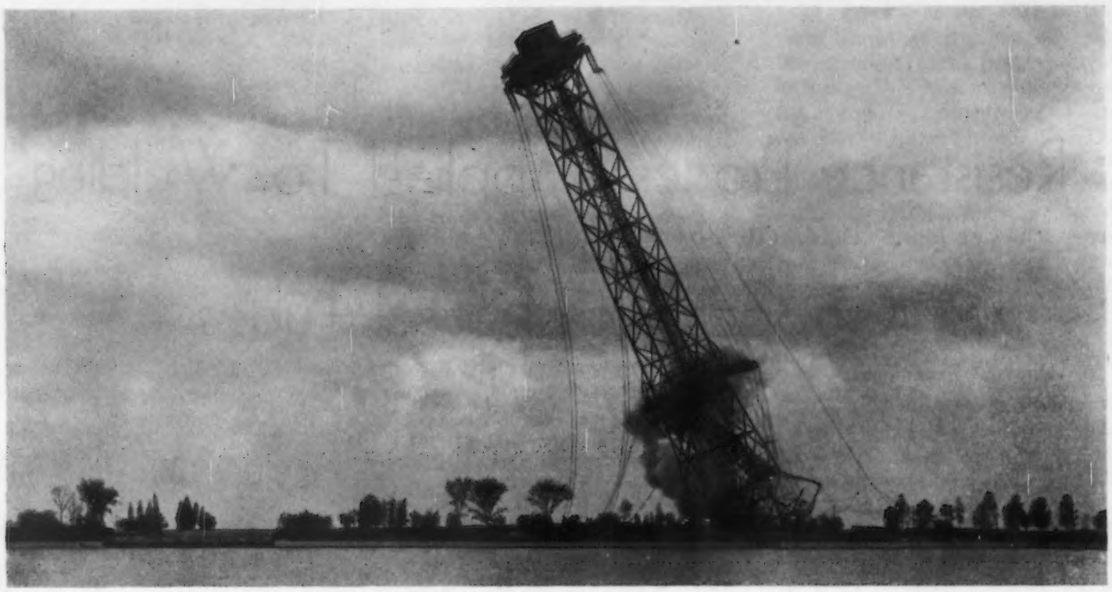


FIG. 2—In this application, the welding transformer serves as a heating unit which is linked with a forming machine that shapes the tubes from flat strip stock.



Thermit Mixture Quickly Fells Century Of Progress Skyride Tower

By M. L. SMITH

Metal & Thermit Corpn., New York

WHAT the Ferris Wheel was to the Columbian Exposition in 1893, the Skyride was to a Century of Progress in 1933 and 1934. Consisting of two 3,000,000-lb. steel towers 628 ft. high, with a cable railway running between their tops, the Skyride furnished thrills for approximately 5,000,000 people during its two seasons of operation.

Since the close of the exposition, the two tall towers of the Skyride have stood guard over the work of demolition; and the wrecking of the east tower marked the final major operation in the removal of the structures of a Century of Progress.

In felling the westerly tower early in the summer, cutting torches and dynamite were employed. For the dropping of the easterly tower, however, a safer and less destructive method was sought and the use of Thermit to melt away sections of two of its legs was decided upon.

Each leg of the tower was made up of three I-beams welded to form an H-section.

Parts of the section of both of the two north legs were cut away by means of an oxy-acetylene torch. The strips cut out were approximately 2 ft. in length and included part of the web of the web beam, as well as the inside flanges and portions of the webs of both flange beams. One point of cutting was near the base of the tower and the other point 10 ft. higher on the same legs. The purpose of this preparation was to reduce the column section and lessen the quantity of metal to be melted by the Thermit mixture.

Four mold boxes lined with fire brick and sand were built around the columns at the points where the cutting had been done. Each of these mold boxes held 750 lb. of Thermit and each was fitted with electrical igniters.

Both of the north columns were cut and prepared with Thermit molds in this manner. Before setting off the Thermit, the diagonal at the back of each of the north legs was cut through near the column base, and also the two south legs of the backstay.

Before a crowd estimated at over 100,000 people, the Thermit mixture was flashed. In a few seconds, the tremendous heat generated by the reaction had melted the steel at the points holding the mold boxes and the legs of the tower collapsed at these points almost immediately. The tower struck the ground with a terrific crash exactly 42 sec. after the button was pushed to ignite the Thermit.

Gear Makers Discuss Technical and Trade Problems

GENERAL pick-up in volume of gear business, with optimism as to the immediate future, and a renewed interest in general association activities, should be mentioned first, perhaps, in reporting the proceedings of the eighteenth semi-annual meeting of the American Gear Manufacturers Association, held at the General Brock Hotel, Niagara Falls, Canada, Oct. 14 and 15.

Concern over a possible lack of skilled labor, the shortage even now beginning to be felt, and the necessity for a resumption of apprentice training was expressed by several speakers. Necessity for intelligent and practical treatment of industrial relations problems was also voiced.

The renewed interest in general association activities is undoubtedly attributable in part to cessation of NRA code activities, which in the past few years had claimed a large, though not exclusive share of the association's attention.

An excellent program of technical papers was arranged by the program committee, headed by B. F. Waterman, engineer, Brown & Sharpe Mfg. Co., and a past president of the association. They covered metallurgical analysis of gear failures; speed increasing gears; durability of automobile spiral bevel gears; and lubrication of inclosed gear units. In addition, progress reports or standard practice recommendations were submitted by several sub-committees of the association's general standardization committee, the chairman of which is T. R. Rideout, engineer, Westinghouse Electric & Mfg. Co.

The non-technical program included addresses on: "Educating Employees—Shop and Office," by H. H. Kerr, president, Boston Gear Works, Inc.; "Trade Association Objectives, Policies and Activities Under Present Conditions," by W. J. Donald, managing director, National Electrical Manufacturers Association; "Analysis of Our Cost Accounting Manual," by H. N. Mathias, Westinghouse Electric & Mfg. Co.; and "Practical Treatment of Industrial Relations Problems," by Louis Ruthenburg, president, Servel, Inc.

A feature of the attendance was the unusually large number of member-companies represented. Winfield H. Smith, Inc., Springville, N. Y., was admitted to membership and O. A. Leutwiler, professor of mechanical engineering, University of Illinois, is a new academic member.

Philadelphia has been selected as the place of the next meeting, planned for the latter part of April, 1936.

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IN his presidential address, A. A. Ross, engineer, General Electric Co., West Lynn, Mass., pointed out that since the last meeting at Niagara Falls, in 1930, the association has passed through the most critical period of its history; it has, however, gained in membership and there has been a notable increase of interest in the association's affairs. In commenting on membership, Mr. Ross stated that the association was of special value perhaps to those member-companies with limited engineering and research organizations and whose entire interest was in cutting gears. The association's recommended practices are a safe guide, he said. "Much of the information that they contain is not available in text books, but even if it were, one would never be quite sure that the practical experience of the author was such that one could safely follow his recommendations; whereas you, who are acquainted with every member of the committees that compile our practices, know that our recommended practices represent the best practical experience in the gear industry."

Resumption of Apprentice Training Urged

Education of employees, shop and office, was broadly discussed by H. H. Kerr, president, Boston Gear Works, North Quincy, Mass., at a dinner meeting on the evening of Oct. 14. The address was thought provoking and brought out considerable discussion by men prominent in the industry.

Mr. Kerr pointed out that during the depression many mechanics and operators had gone into other lines, retired or had died. In curtailing their operations, gear makers had eliminated or reduced their apprentice courses and had not taken on learners, because of the necessity of giving their regular employees as much work as possible. With the upward movement of business the gear industry is confronted with the problem of getting suitable men to make up the shortage.

"What are we doing to educate men to make up this shortage and what program is industry adopting to prevent repetition of such shortage in the future," he asked.

Mr. Kerr's company has trained apprentices for many years. It actively cooperates with the local trade schools (Quincy) as well as with Boston schools. In this connection Mr. Kerr said that they believed that industry can be very useful in cooperating and helping outline a program for the guidance of school authorities.

If beginners are to receive proper training they must not only have close supervision, but must work beside skilled men, said Mr. Kerr. in another part. "Observation of the movements and methods of the older and experienced employees has a great influence toward habit forming. For that reason alone it would be unwise to have more than one apprentice working in a group of 10 or less, or more than two in a group of 10 to 20."

In apprentice training you are training your future executives, while, as a rule, the trained "learner" remains a machine operator, he continued. Apprentice trained men become familiar with all plant equipment and personnel, and can be transferred to take over peak loads in any department. The more of these generally trained men you have, the better you are able to marshal your forces and keep abreast of the times, he said.

Methods of apprentice training, particularly those applicable to a small shop, were discussed. These include use of cooperative trade schools in which the boy alternates between classroom and shops, and the training of worthy boys in one's own shop under foreman supervision, with a related subject

course laid out for evening study. Mr. Kerr said that his company has had excellent results with the latter type of training, some of its key men having been graduates of this type of course. Boys that have completed two years in a trade school are also taken into their shops for completion of their training.

Something of the spirit in which this training is carried out is reflected from the following remark by Mr. Kerr: "As the boy progresses we try to instil in him the dignity of labor and the pleasure of accomplishment. We endeavor to make him independent and to stand on his own feet. We encourage saving, the taking out of insurance, and, eventually, home ownership."

Office employees are recruited from the high schools, vocational directors of which are kept in touch with the company's needs. Boys and girls of good general average, rather than those who may have been extremely good in one particular subject, are preferred. Their training within the office is in the direction of flexibilty, so that should the occasion arise they can substitute in other office positions.

Mr. Kerr stressed the importance of taking greater interest in employees, "your largest as well as your most valuable investment."

Mr. Kerr also touched on general industrial relations, a subject that was taken up more in detail at a session under the chairmanship of E. S. Sawtelle, vice-president, Tool Steel Gear & Pinion Co., Cincinnati, and chairman of the association's industrial relations committee. Remarks at this session indicated that with the changes occurring in industry there has arisen a new need for the cultivation of sympathetic relations between employer and employee. A comprehensive paper on the "Practical Treatment of Industrial Relations," by Louis Ruthenburg, president, Servel, Inc., was, in Mr. Ruthenburg's absence, ably presented by F. H. Fowler, president, Foote Bros. Gear & Machine Co., Chicago.

Microscope Analysis of Gear Failures

TYPICAL problems referred to the gear metallurgist were outlined and the reasons for the troubles as revealed by microscopic analysis were discussed in a paper on "Metallurgical Analysis of Gear Failures as Seen Through the Microscope," by John T. Howat, Pittsburgh Steel Foundry Corpn., Glassport, Pa.

The theory on which heat-treating processes are based was outlined briefly, and a few of the standard microstructures used as a criterion in analyzing gear problems were reviewed. In the analysis of gear failures, a 0.40-0.50 carbon steel forged crane gear formed the basis of discussion. The gear may have been returned from service for any one of the following reasons: Rapid wear of teeth; teeth broken off sharp at root diameter; corners of teeth broken off; teeth broken off from fatigue fracture; cracked through web; cracked through rim; cracked through hub or bore; cracked at junction of arm to rim or hub; and spalling of surface metal at pitch line. The first step in analyzing any complaint, said Mr. Howat, is to make sure that the gear is one of your own manufacture.

"Since fully 75 per cent of gear failures are directly or indirectly traceable to quenching strains, it would appear that we have overlooked a pertinent factor in our heat-treating process," he said in another part. "The fact that a 0.15 to 0.25 carbon-steel gear, carburized and water quenched, having a tensile strength of 35,000-40,000 lb. will make a satisfactory gear for many installations would clearly indicate that we need to harden the teeth only, and leave the rest of the gear as soft as possible. The dimensional changes that take place on heating and quenching a piece of steel were outlined briefly in explaining why excess quenching strains cause most gear failures. A minimum amount of quenching will result in lower internal strains and, therefore, a safer gear.

From his discussion of heat-treated medium carbon and alloy steel gears, Mr. Howat went on to the troubles experienced with 0.15 to 0.25 carburized gears and pinions. Further reference to this paper, which received general commendation in the discussion, will be made in a forthcoming issue of THE IRON AGE.

Speed Increasing Gears

Speed increasing gears and the technical differences between them and speed decreasing gears were dealt with in brief but highly regarded papers by P. C. Day and W. P. Schmitter, chief engineer and research engineer respectively, Falk Corpn., Milwaukee.

Discussion of the subject was to dispel the idea that there is any essential difference between the speed increasing gear and the speed reducing gear, except in minor matters of design incidental to the average nature of speed increasing applications.

The real problem of the speed increasing gear is the same as that of the high-speed gear and includes accuracy of gear tooth form, spacing and concentricity, accurate balance of rotating parts, accurate alinement of shafts and careful attention to the design and proportions of the bearings, which, alone, exert more influence on the mechanical efficiency of high-speed gearing than everything else combined, said Mr. Day.

Recent successful applications of speed increasing gears include transmissions between medium-speed Diesel engines and centrifugal pumps, transmission from slow-speed vertical water wheels or hydraulic turbines to vertical or horizontal pumps or generators. The company is now considering the problem in connection with the Passamaquoddy project which involves the possibility of using speed-increasing gears to transmit 20,000 hp. from a very slow speed hydraulic turbine to one or two generators.

Mr. Schmitter, whose paper was devoted to the technical differences between speed increasing and decreasing gears, also said that there appears to be little justification for the idea that there is any important fundamental difference in the design and operation of a speed increasing gear from that of a speed reducing gear. Probably the individual characteristics of the system to which the gear is applied exert a greater influence upon durability, efficiency and quietness of operation than does the extent of action in the approach and recess, he stated.

"It is generally known that there is a technical difference between the action of a gear set dependent upon which is the driver, and that the degree of variation is determined by the ratio and tooth modification," he continued. "As shown by Mr. Day, circumstances limit the influence of these factors in the case of high-speed increasers, but it is the purpose of this part of the paper to discuss critically the several effects under ordinary and exaggerated conditions."

Durability of Spiral Bevels

A comprehensive paper on "Factors Influencing the Durability of Automobile Spiral Bevel Gears," was presented by J. O. Almen, head of the dynamics section, research division, General Motors Corpn.

Failure of gears in service is, in general, due to tooth breakage, to the destruction of the tooth surfaces by wear of several kinds, and to pitting, said Mr. Almen. An organized effort to determine the causes of failure in automobile gears and to find practical remedies has been made by the General Motors research division. Laboratory breakdown tests have been run on some 400 automobile and truck

rear axles, and thousands of service records have been examined for correlating the laboratory tests and the performance of the gears in normal service. This study has led to definite conclusions, particularly for spiral bevel rear axle gears. It is probable, however, that many of the factors that influence the service life of such gears will also apply to gear sets in general, he said.

"It has been found that gear tooth breakage in service is due to fatigue and that this fact provides data for more accurate tooth stress calculation than has been possible heretofore," said Mr. Almen. "Destruction of rear axle gear tooth surfaces by scoring is due to welding of small areas to the mating teeth under the influence of high pressure and high temperature. Pitting results from fatigue of the tooth surface due to repeated high compressive stresses and is of the same nature as encountered in ball and roller bearings.

"Among the alloy steels that have been used for carburized automobile rear axle gears, it cannot be shown that one is superior to another except for warping tendencies and consequent variations in stress concentration, and machinability."

In discussing the criterion for axle gear failure Mr. Almen said that it is not generally realized that no form of test short of operation in actual service will produce reliable data. Efforts to draw conclusions from arbitrary laboratory tests lead all too frequently to misconceptions of design and material requirements. An example is found, he said, in the long-held belief that axle gear failure in service was due to shock loading with the consequence that tests and material specifications were drawn to meet conditions that did not exist in service.

Effect of material and heat treatment, effect of stress concentration factors on axle life, factors affecting load concentration at the heel of the tooth, and stress distribution between pinion and ring gear were discussed. Surface pitting, which occurs in regions subjected to high compressive stress and is a common form of gear failure, was also dealt with, as well as the type of gear tooth wear variously referred to as scoring, roping, spalling, etc.

In an address on the "Lubrication of Enclosed Gear Drives," J. L. Draper, chief lubrication engineer, Texas Co., Boston, discussed the properties which any gear lubricant should possess if it is to function effectively and the relative importance of these requirements depending upon the type of gear, mode of operation and the method of lubrication. It was pointed out that considerable attention has been devoted by the oil industry to research as a basis for the manufacture of gear lubricants.

New Recommended Practices Adopted

RECOMMENDED practices were proposed by the A.G.M.A. nonmetallic gearing committee and by the speed reducer section, and progress reports were submitted by other sub-committees of the association's standardization committee.

The practice offered by the nonmetallic committee, which is headed by H. R. Moyer, Westinghouse Electric & Mfg. Co., is intended to serve as a guide for preferred pitches. Two preferred pitch tables are given, one based on horsepower load at a given pitch line velocity and the other based on the applied torque. The tables are applicable to both rawhide and phenolic laminated type materials.

Recommended practice for rating of helical and herringbone gear reducers used for oil field pumping units was proposed by the speed reducer section and accepted by the association. Activities of this section, the chairman of which is E. P. Connell, Falk Corpn., Milwaukee, have been along engineering lines.

Appointment of three new technical sub-committees to cover gear geometry, gear noise, and helical gears respectively, were announced by the general standardization committee, the chairman of which is T. R. Rideout, Westinghouse Electric & Mfg. Co. The metallurgical committee is being divided into three groups, covering steel, bronze and cast iron respectively.

Further tests on worm gear bronzes are among the activities of the metallurgical committee, which is headed by C. B. Hamilton, Jr., president, Hamilton Gear & Machine Co., Toronto, Canada.

The gearmotors committee, the chairman of which is L. R. Botsai, Westinghouse Electric & Mfg. Co., has an active program. The nomenclature committee, D. T. Hamilton, engineer, Fellows Gear Shaper Co., chairman, is working on gear dynamics. New testing equipment recently made available will be added to the inspection committees recommended practice accepted by the association some time ago.

Funds made available by the sale of Prof. Earle Buckingham's "Manual of Gear Design" (recently published by the Industrial Press, New York) to members will be applied to the printing of A.G.M.A. recommended practices and standards. This work is under the direction of the library committee, which is headed by M. T. Schumb, engineer, Boston Gear Works, Inc.

McCarthy, of Wickwire Spencer Honored by the Wire Association

THE award of the Wire Association medal for distinguished contributions to information on the making of wire to Benjamin Lewis McCarthy, chief metallurgist and chemist of the Wickwire Spencer Steel Co., Buffalo, was the main event in the recent five-day convention of the Wire Association at Chicago. The medal was awarded to Mr. McCarthy in recognition of his outstanding paper, "Grain Size and Its Influence on the Manufacture of Steel Wire." An abstract of this paper appeared in the Oct. 3 and Oct. 10 issues of THE IRON AGE, and the complete paper was originally published in the September issue of *Wire and Wire Products*, the official magazine of the wire industry.

In the past, wire making was somewhat divorced from the general process of steel making. Some authorities claim that Mr. McCarthy's paper is the most far-reaching steel research in recent years, and has served to place the making of wire on the same exact scientific basis as steel making. Not only should this paper precipitate a minor revolution in manufacturing processes in the wire industry, but should result in a generally finer and more predictable product.

At the annual election of the Wire association, the former officers were reelected as follows: President, John Mordica, superintendent of the rod and wire works of the Bethlehem Steel Co., Sparrows Point, Md.; vice-presidents, L. D. Granger, assistant to the vice-president, Wickwire Spencer Steel Co., New York, and E. W. Clark, managing engineer wire department of the General Electric Co., Schenectady. R. E. Brown, publisher of the organ, *Wire and Wire Products*, was reelected secretary of the association.

Improvements in Production

Internal Gear Finishing Machine Features Crossed Axes Tool Movements

THE single purpose, internal gear finisher here illustrated has been announced by the Michigan Tool Co., Detroit. The development involves the "shaving" principles common to Michigan crossed axes machines now employed in gear plants for the finishing of helical and spur gears.

Marked work-flexibility is featured by a pot-chuck fitted with adapters, variable to practically any normal size of internal gear. It will be noted from the insert that a laminated or serrated cutter is mounted on a vertical arbor. The arbor in turn is mounted in an eccentrically driven holder.

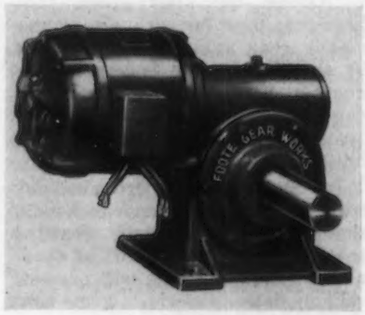
As the cutter carrying arbor rotates, driving the internal gear which with its adapter is free to turn on roller bearings, the arbor holder slowly rotates eccentrically so that the arbor itself moves gradually on an arc, approaching the internal gear. As it moves on this arc the cutting teeth thus feed outwardly and into the internal gear teeth. At the center point of this arc, representing the closest approach of the arbor to the internal gear, the pitch circles of the cutter teeth and the internal gear teeth coincide, and the maximum depth of cut is reached. The cutter moves beyond this point, the arc again moving away. At the end of travel on this arc, the machine automatically reverses and the arbor travels back through the same arc. On the forward travel, the flanks on the back side of the internal gear teeth are finished, while on the reverse travel the flanks on the forward side of the teeth are similarly shaved.

Axes for the arbor and for the internal gear are at an angle to each other; this angle is readily adjustable in either large or in minute amounts. The crossed axes result in a relative sliding motion of the cutter and work teeth, lengthwise of the tooth, thus producing the shaving action diagonally across the tooth flank.

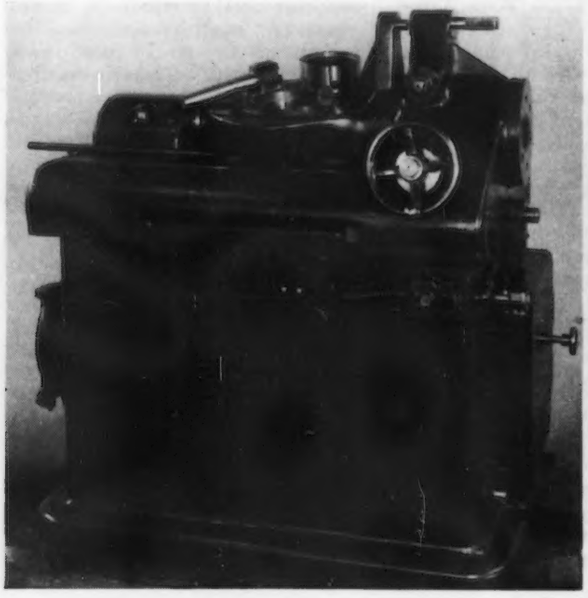
Length of the arc is adjustable as is the rate of feed, and the positioning of the automatic stop and automatic reverse. The pot-chuck table is adjustable for varying center distances. All adjustments involving tooth form can be checked either by graduations or through the use of a sine-bar. Cutting fluid flow is from the bottom and washes chips out downwardly.

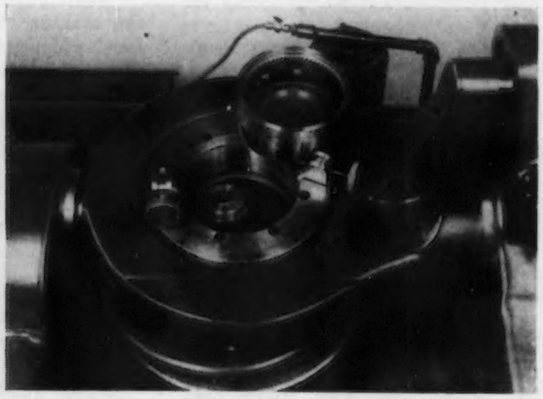
Motorized Worm Speed Reducers

MOTORIZED worm speed reducers are being offered in single reducer and double reducer types by Foote Gear Works, Inc.,



1301 South Cicero Avenue, Chicago. Single reducers may be had either horizontal or vertical and





AN arbor-mounted cutter and an overdrive transmission gear work piece are shown on top of this gear finishing machine. Vertical mounting of the cutter on the arbor, which moves back and forth slowly on an arc, is pictured above as well as ring adapter installation and pot-chuck table adjustability.

and Shop Equipment . . .

the double reducers may be had either in the horizontal type or with the motor at the top.

Single reducers have 1750 r.p.m. motors in eight ratios—from 8-1 to 60-1 and 1150 r.p.m. motors in seven ratios from 7-1 to 40-1. Double reducers have 1750 r.p.m. motors in 12 ratios from 35-1 to 1750-1 and 1150 r.p.m. motors in 12 ratios from 23-1 to 1150-1. Motors range from ¼ hp. to 7½ hp. These reducers have high efficiency. Patented mounting feature permits disassembly of motor without disturbing reducer.

All bearings are of the antifriction type with oil and dustproof housings. The shaft is of the free floating type and protection is afforded against oil entering the motor.

High-Speed Tapping Attachments

SENSITIVE cone friction clutches of new design are used to drive Ettco-Emerick tapping attachments announced by Ettco Tool Co., 594 Johnson Ave., Brooklyn, N. Y. Two sizes, No. 100 for 3/16-in. taps, and No. 200 for ¼-in. taps and having practical speed of 2000 r.p.m., are available. A system of baffles within a one-piece oil-tight housing serves to give a centrifugal pump effect for the oil bath in which mechanism operates. The housing is equipped with an oil sight glass. All gears are helical with compound reversing idlers to balance the thrust. Ball bearings are used for the driving and reverse clutch shells. Type of housing is varied to meet requirements.

Reamer Blade Adjustability Provides For Wider Production Use

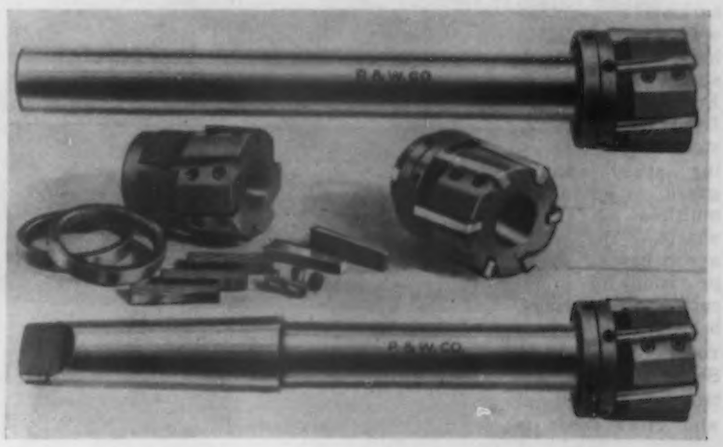
ACCURATE blade alinement and positioning in a reamer body feature a new patented adjustable serrated blade reamer, in both shell and shank types, by Pratt & Whitney Co., Hartford, Conn. See illustrations below. Heavy design is noted with points of stress given excess support. The blades are made from a tough high-speed steel, file hard with a high Rockwell hardness reading. The alloy cams for blade locking are hardened and ground. Two cams lock each blade in place. Serrations on one side of each blade fit into corresponding serrations in the reamer body. Two nuts at the back end of each blade permit of easy adjustment for size.

In all types of these "camlock" reamers the blades are pushed forward to increase the cutting diameter. This permits functioning equally well in through holes, blind holes or against shoulders. When the two back nuts are loosened a clockwise turn loosens all cams and a quarter turn of the adjusting nut forward increases reamer diameter 0.0003 in. A counterclockwise turn locks the blades. To decrease diameter the movements are reversed. Serrations play an important part in adjustments in that the placing of a blade in the next serrated stop increases the diameter by 1/16 in. This design avoids undesirable blade projection.

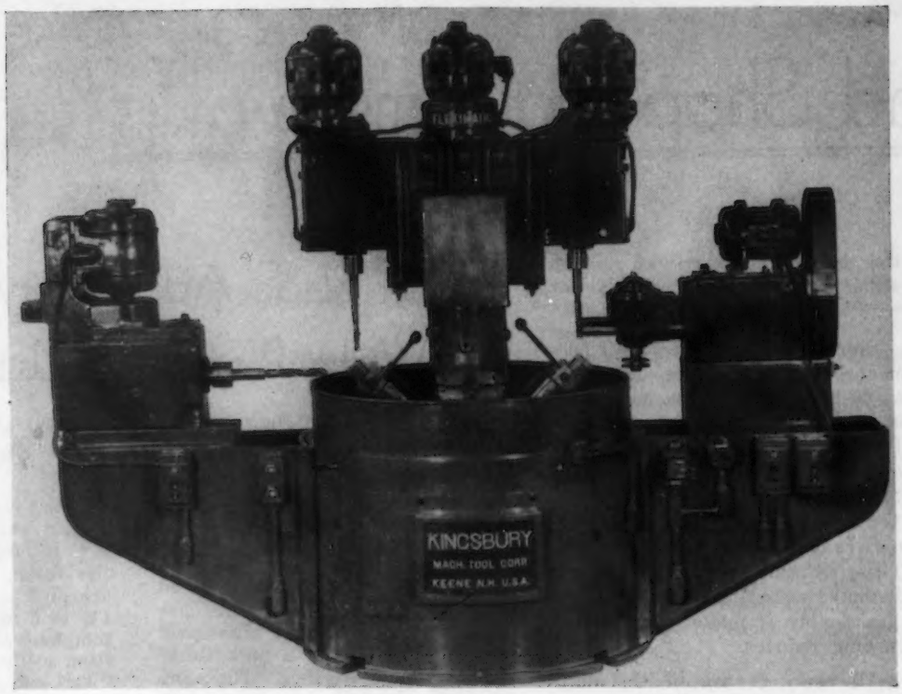
Both reamer types have left hand spirals as standard. All parts are interchangeable within each size range. Seven sizes of blades are used to cover the range from 1¼ to 6 in. inclusive. Ten arbors complete a set of shell reamers from 1½ to 6 in. inclusive.

New Oil-Proof V-Belt

AN oil-proof V-belt for general industrial use has been announced by Dayton Rubber Mfg. Co., Dayton, Ohio. The principal field of application for "daycoil" belting will be in the machine tool and other industries where excessive oil condition may exist in connection with power transmission. In construction, laminated principles, plus a specially designed casing of a new synthetic compound, are employed. The oil-proof material has the properties of natural rubber, while aging properties are many times that of rubber. Largely increased abrasive and wearing qualities when subjected to oils and solvents are claimed. Extensive laboratory and industrial tests have been conducted over a period of two years.



Flexibility Features Assembled Work Units



MANUFACTURING equipment by the Kingsbury Machine Tool Corpn., Keene, N. H., which features rapid production through the use of individually driven and fed units for drilling, milling and tapping, includes a center column for a rotating table or turret, and slides on which unit mechanisms may be positioned with respect to the operations to be performed on work pieces. Table indexing ranges from four to eight indexes per revolution with double indexing available. Sliding contact with the index registering pawl is avoided.

A three position indexing switch provides (1) indexing at the completion of the longest work cycle, (2) push button control by the operator at the completion of each cycle, (3) inching the table out of set position. Provision is made that all spindles are in retracted position before indexing is possible.

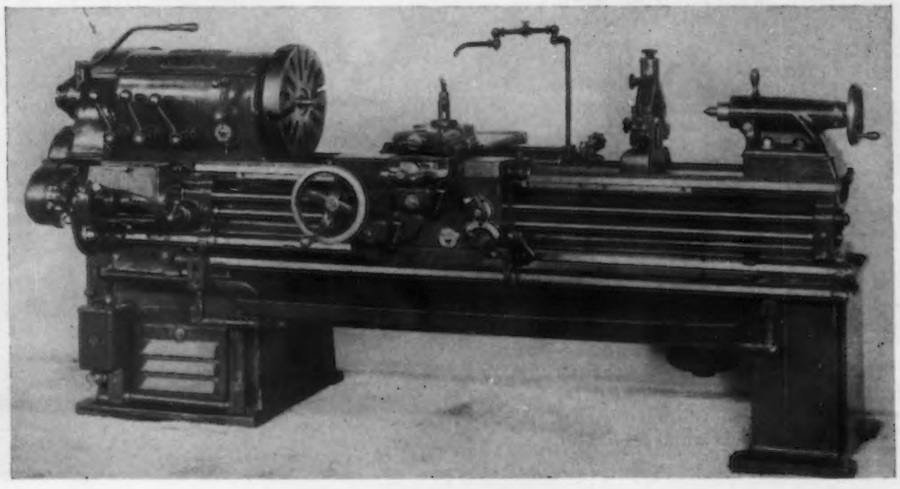
The tool units are tripped electrically through solenoids as the indexing motor reverses to lock the table in indexed position.

A 36-in. rotary table has a finished surface for 32-in. fixtures. This surface is 33 in. above the floor. The base is 48-in. O. D.

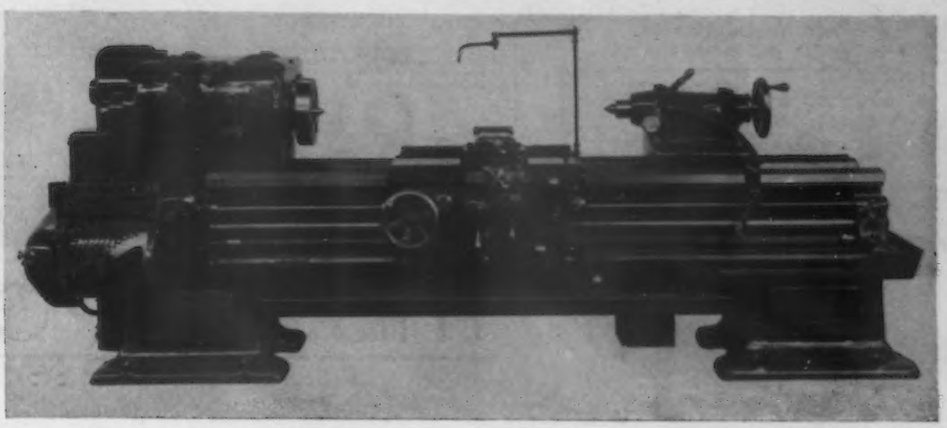
Each head has longitudinal screw adjustment through a dovetail adapter; a binding lever is located at the top of each head. A built-in solenoid provides remote control for the feed clutch or air control may be used.

Improved Model Toolroom Lathe

THIS new model toolroom lathe by Reed - Prentice Corpn., Worcester, Mass., is built in 14, 16, 18 and 20-in. sizes. Four bearing Timken precision spindle mounting with anti-friction bearings on back shafts is specified. Four levers at the front of the headstock operate sliding speed change gears mounted on multiple splined shafts. Box type apron has oil pump provision for lubricating all bearings, bed-ways and carriage cross slide. Separate clutch control for longitudinal and cross feeds is within the apron. Clutch and brake control for spindle is operated from the head and from the apron. The flat bed bearing for the carriage has vertical face with adjustable taper gibs. Sixteen spindle speeds are provided. The new toolroom lathe is illustrated below.



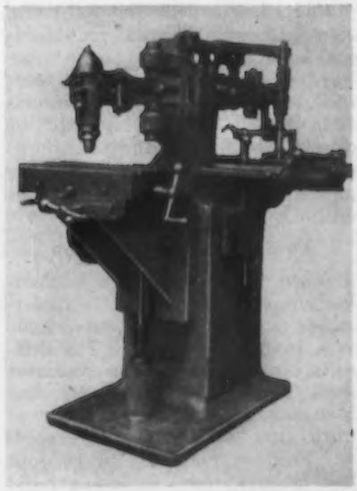
Lathe Designed For Wide Cutting Range



A NEW heavy duty, 20-in. x 10-ft., ball bearing geared head engine lathe, with Timken bearings on spindle is here shown and is a product of the Springfield Machine Tool Co., Springfield, Ohio. Designed particularly for heavy cuts with high-speed steel and high-speed cuts with carboloy tools, the machine has a massive 16-speed headstock and is equipped with either helical or spur gear trains. The oil reservoir is located in the first pocket of the bed rather than at the bottom of the headstock. The reversing mechanism for the lead-screw is mounted on the rear of the headstock where it can be readily examined. These design features permit the use of heavy gears and shafts. All gears are ball bearing mounted and run in oil. The attached heavy duty gear box gives 36 changes of threads and feeds. The apron is of box construction with removable front plate, and carries an oil pump and reservoir for lubricating all apron, carriage and lower slide compound rest bearings. Long broad bearings feature the carriage and tailstock. The bed is 20¼ in. across the vees and weighs 290 lb. to the ft. Shipping weight on a 10-ft. bed is approximately 9000 lb. A 10-hp. motor is recommended.

Universal Die Sinker For Molding Industries

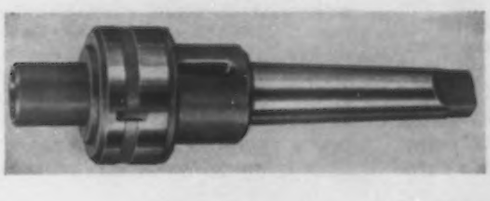
A UNIVERSAL, die sinking, profiling and engraving machine, for die casting and plastic mold industries, has been developed



by the Marquette Mechanical Engineering Co., 4346 Lake Park Avenue, Chicago. Machine control is optional; automatic, semi-automatic or manual. The illustration shown above is of a machine electrically controlled, equipped with electric-eye mechanism, and having cutter capacity from ⅛ to ⅜ in. straight or taper shank cutters. The up-and-down movement of the work table is controlled by tracer-point contact with a reversing motor, mounted within the column and driving through a universal joint. Side and in-and-out movements are controlled by electric-eye operation of separate motors. The copytable is adjustable vertically and horizontally by lead screws. Anti-friction bearings are used throughout. Longitudinal feed 16 in. Cross feed 14 in. Table 20 x 12 in. Weight 1800 lb.

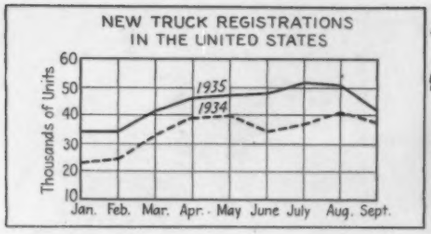
Line of Compensating Tool Holders

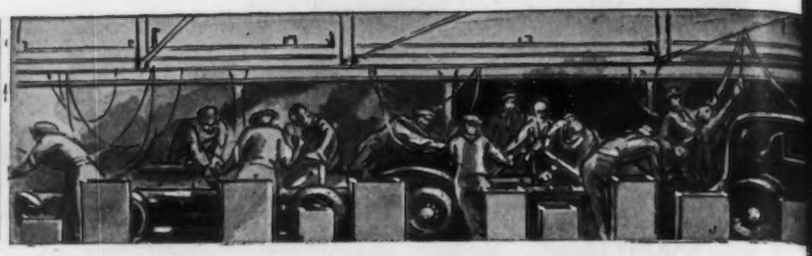
AN automatically compensating tool holder, in capacities up to 5-in. tool diameters and in types to fit either hand or automatic screw machines, drilling and tapping machines and various types of multiple spindle production machines, is announced as a tool line addition by the J. C. Glenzer Co., 6463 Epworth Boulevard, Detroit. The assembled holder comprises 11 alloy steel parts. Staggered brass and steel balls are used in the thrust ball race to distribute contact and eliminate friction; otherwise only precision finished steel parts are employed. The plunger spring, operating the centralizing plunger, is alterable for varying tension or may be removed if centralizer effect is not wanted. The removal of a cap exposes all parts for lubrication.



Junior Portable Drills

BLACK & DECKER MFG. CO., Towson, Md., has announced a ½-in. size Junior drilling equipment as a companion to the ¼-in. size built for some time. The drill is said to be amply powered for drilling holes up to ½ in. in steel and for driving wood augers up to 1¼ in. in size. Low spindle speed and powerful torque are adapted to the cutting of clean round holes in wood, composition or metal. Net weight is 10½ lb. The motor is universal.





THIS WEEK ON THE A

Steel Releases Grow in Volume as Car Production Expands

DETROIT, Oct. 22.

WITH new car announcements popping on all sides, it appears that most companies will have formally introduced their 1936 lines before the New York automobile show opens Nov. 2. Buick and Packard started the proceedings Sept. 28 and soon were followed by Cadillac and LaSalle. The last week-end brought five new entries—Ford, Pontiac, Dodge, Hudson and Oldsmobile. Next Saturday Plymouth and Chrysler will make their bows.

In some cases, such as Oldsmobile, the original plan was to hold back the new line until Nov. 2, but the managements yielded to pressure from dealers to advance announcement dates and plunge immediately into an intensive selling campaign. The point is that each manufacturer knows that there exists a certain group of buyers itching to own the newest thing in automobiles and the first salesmen to reach this group have the best chance of selling them.

Not since boom days have automotive executives been so willing to cast caution to the winds in predicting great things for a coming year. Production facilities have been increased, Ford having spent $32,000,000 and Chevrolet $25,000,000 for this purpose. Advertising and sales promotional appropriations have been considerably stretched. Field selling staffs maintained by factories have been enlarged and the number of dealers increased. Car makers are planning to build tremendous stocks of parts ahead.

Yet the industry is not fooling itself into believing that fall introductions of new models are a cure-all for the seasonal ills which it always has had. It doesn't think that December, January and February will rival March, April and May as selling months. The buying habits of the public can't be revolutionized to that extent. It is confident, however, that November and December will be relatively good months in retail car sales, since every company which has introduced new lines at other than the year-end has experienced a considerable rise in sales volume during the first two months. This normal expectancy is enhanced by the sales drive which practically every manufacturer will make to get prospective buyers to invest in new cars as Christmas presents.

January and February will be the black spots on the automotive sales map, November and December taking business from those two months. This is the studied opinion of the high command of General Motors. If sales during those months are sluggish, no one will worry greatly about the situation. Attention will be given to building up stocks of parts for the increased assemblies which inevitably will come in the spring months.

Even pessimists regarding fall introductions are willing to grant that the four months from November through February will be at least as good as during the years when new models were offered in December and January. In those four months of 1934-35 there were sold to retail customers in the United States 490,180 passenger cars and 212,315 trucks, a total of 702,495 new units. Records of the last six years show that an average of 20.7 per cent of the year's passenger car business and 24 per cent of the truck business was done in November, December, January and February. Thus these months aren't the sales ogres that some people think they are.

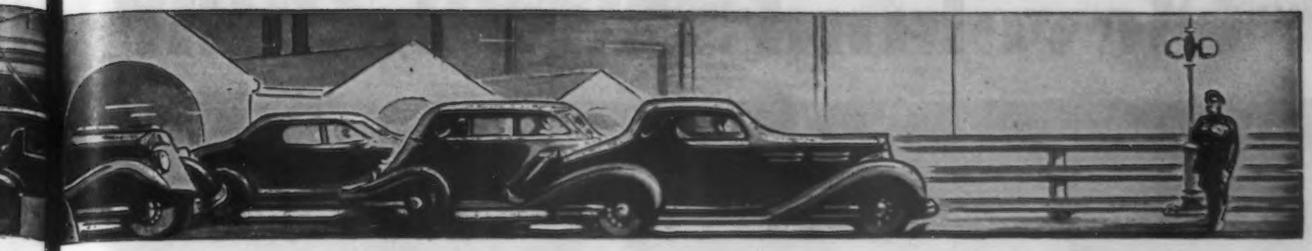
Car production and steel releases are both mounting. Assemblies this month promise to be around 175,000 units, which is less than earlier estimates due to the fact that two important companies have had trouble mastering new manufacturing processes. A sharp gain in output is assured during November.

Steel buying has broadened from most automotive sources. General Motors and Chrysler are taking in steel at a fairly lively clip, while Ford the past week placed some orders for flat-rolled steel, although the total tonnage is not believed to have been large. Ford this week will put the first trial ingot through its continuous strip mill. It probably will be close to the first of the year, however, before Ford will be getting any appreciable tonnage off this mill.

Ford Expands Production

When Ford announced its new V-eight on Saturday, it is understood to have had about 20,000 cars in dealers' hands. The difficulty in stamping the radiator shell and grille apparently has been cleared up and production of Ford cars should increase rapidly. Ford is planning to get out just as many cars as it can build in the next 30 days. By the middle of November it will attain its 1935 objective of 1,000,000 cars.

Ford incidentally has advanced $5 to $15 the list prices of its standard models, the cheapest car in its 1936 line being the five-window coupe at $510. Deluxe



ASSEMBLY LINE

models have been reduced $5 to $10, with the five-window coupe at $555.

Chevrolet, eager to give dealers plenty of cars to sell at announcement time on Nov. 2, expects to have around 40,000 in the field then and is counting on making 100,000 during November. By early December Chevrolet will have turned out over 1,000,000 units this year. It has sold more than 250,000 of its Standard passenger cars since Jan. 1. The Standard car for 1936 has practically the same outward appearance as the Master Deluxe, the main difference being the latter's longer wheelbase and knee action. The Standard will have a new frame of rigid box section. The box girder members add so much to its rigidity that only three cross-members are required. The simplicity of the frame design facilitates access to the chassis for lubrication and service.

Graham To Drop Eights

Graham is dropping its line of eights and supercharged eights for 1936 and concentrating all its operations on three series of six-cylinder cars: Crusader six, Cavalier six, and the Supercharger, introducing for the first time the supercharger to the lower-price market. The supercharger heretofore has been found only on the eights priced at $1,095 to $1,215. The Graham sixes will have new body design of all-steel construction, including steel roof. They also will have hydraulic brakes, artillery type steel wheels, silent transmission with helical gears and synchronizers, aluminum cylinder heads and aluminum pistons.

It is understood that Continental will furnish the engines for the new Grahams as well as for the new Reo Flying Cloud Six. It is reported that Graham and Reo body panels will be made from the same dies by Hayes Body, this arrangement cutting down tooling costs considerably for both companies. Reo will have a new all-welded frame of the pressed steel,

BY BURNHAM FINNEY

Detroit Editor, The Iron Age

o o o

double-drop type with central X brace.

Plymouth, excepting to build 100,000 cars this quarter and 500,000 during 1936, has its heart set on being able to assemble 3000 cars a day next spring during the rush season. It has the capacity to do this, with plants at Detroit, Evansville and Los Angeles. It is limited, however, by the fact that it can make only 2400 cylinder blocks a day at its local factory. To get around this restriction it already is well along on a program of building up a backlog of 100,000 blocks which it can draw on next spring when its machining lines cannot keep pace with assembly requirements. It figures that this is cheaper at the moment than to invest in additional equipment. If Plymouth keeps expanding, however, it will be compelled next year to increase its productive capacity at Detroit by 25 per cent, according to competent observers.

Chrysler Simplifies Line

Chrysler is simplifying its set-up for the coming year by reducing its series of cars from seven to four—Chrysler six, Deluxe eight, Airflow eight and Airflow Imperial—and eliminating the Airstream name. Each Airflow series will have only two body styles, whereas the Chrysler six will have six body styles and the Deluxe eight will have seven. The automatic overdrive will be available on all cars. For some inexplicable reason, probable because it doesn't want to appear to be following in the footsteps of General Motors, Chrysler-made cars are playing down in their advertising and publicity the fact that they (with exception of Plymouth) have steel roofs.

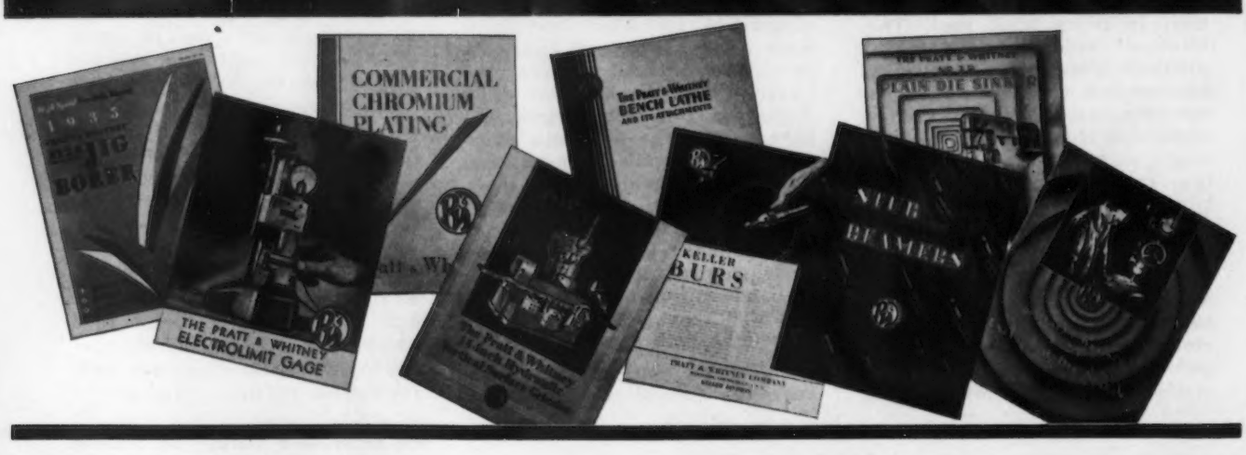
Studebaker, anticipating a good year, has formed the Studebaker Pacific Corpn. to manufacture cars at 4530 Loma Vista Avenue, Los Angeles, with C. K. Whittaker as president, and Stanley R. Whitworth as vice-president in charge of production. This subsidiary will furnish cars to the Pacific Coast, Utah, Nevada, Arizona, New Mexico and the Hawaiian Islands.

Packard is well on its way toward its goal of building 7000 cars in October. On Oct. 10 it again set a new high mark for a single day's production when 490 cars were assembled. In high spirits over the sales reception accorded its 120 series, the management is reported considering the purchase of additional equipment to raise productive capacity to 50 units an hour. There is much doubt, however, whether this program will be carried through.

If some of the plans now afoot are carried out, steel will have to look to its laurels. The success which Ford has had with its cast alloy steel crankshaft has led others to experiment with the casting of this important part. One development which is reported to have been perfected is a cast iron crankshaft containing nickel and molybdenum. The story is that Plymouth is seriously debating a switch over to this type of crankshaft and has secured prices on the manufacture of 3000 a day from a well-known foundry.

Another place where cast iron seems to be winning additional advocates is for use in brake drums, being especially adapted for use as the braking surface. The high speeds at which cars are driven today make effective braking a major problem and apparently cast iron is winning favor over other materials in solving it. In the case of Pontiac, for example, cast iron brake drums have been developed which contain 0.07 to 0.15 per cent of nickel and 0.15 to 0.25 per cent of chromium and which have a Brinell hardness of 187 to 228. These drums are made for Pontiac by Kelsey-Hayes.

The Cleveland Show taught



many lessons. Are you going to profit from it?

We can help you . .

No man could see the millions of dollars worth of equipment assembled in Cleveland without experiencing a thrill of pride in American achievement. Neither could any man view those tremendous ranks of gray machines in their colorful settings and feel fully satisfied with his own shop back home. The lesson was a strong one, and many a man realized for the first time how obsolete his own machines had become.

The replacement of obsolete machines in all industries has begun. The large volume of sales recorded on the floor at Cleveland is a definite fact which points to increased business and increased confidence in the future. Many chief executives left Cleveland to issue direct orders to purchase equipment which could show a profit in their shops.

Buying new equipment is not an easy matter. There is a long job ahead for the shop executive in applying to his problems the things he learned in Cleveland. By careful selection he can bring his shop up to a new high level of efficiency using the ideas he saw demonstrated at the Show. But to pick out the things he needs from the bewildering array massed on the floor in that huge underground building is difficult.

We of Pratt & Whitney stand ready to help in this work to our utmost ability. Our sales engineers will be glad to sit down quietly with you and work out your shop problems. You will find us sincerely interested in your needs and ready to cooperate. In the meantime if you lack any of the literature illustrated below we will be glad to forward it to you.

PRATT & WHITNEY CO.

HARTFORD, CONNECTICUT, U.S.A.

Structural Steel Fabricators Seek Market

LAST summer, the American Institute of Steel Construction adopted a comprehensive plan for improving conditions in its industry by dissemination of statistics covering the actual experience of its members as a group. Details of the plan were covered in THE IRON AGE, July 18, 1935, page 49. Last week, at the Greenbrier Hotel, White Sulphur Springs, W. Va., the members of the institute had an opportunity at their thirteenth annual convention to discuss the results of the plan after three months of operation.

Under the direction of Robert T. Brooks, executive vice-president of the institute, fabricators were given the chance to state frankly their ideas as to the true worth of the new plan for cooperative effort. The response was definitely encouraging. It was immediately evident that knowledge of the experience of their competitors is prompting individual fabricators to reduce their shop costs in order to maintain their competitive positions. This factor alone seemed to be sufficient justification for continuance of the statistical service now being offered by the institute.

Under the plan, the statistical department of the institute provided members with a rough outline of 1934 costs as reported by the fabricators as a group. Many of these costs items, such as material, freight rates, insurance, taxes and general administrative expense are relatively stable on most ordinary jobs. Variables occur principally in shop expense, overhead and labor. By urging its members to set up the 1934 cost experience as a sort of yardstick and basing their current bids on actual business facts, it was hoped that profitless bidding might be eliminated. While this purpose has not yet been fully accomplished, fabricators are rapidly being taught that their hope of making a low bid on which a profit may be realized lies only in the reduction of those costs which would normally vary in individual plants. This calls for improved plant efficiency and not necessarily for a general advance in the fabricating price level.

How the Bid Depository Functions

The bid depository set up by the institute's statistical department naturally deals only in the past tense. It is conducted in compliance with the following rules:

(1) Each bidder shall mail or deliver to the department of statistics a statement or copy of each bid for the sale of structural steel or erection work on structural steel aggregating 50 tons or more, such statement or copy to identify the job on which the bid was submitted, including the name of the owner or contractor to whom the bid was made, and to show the tonnage of the job, the amount of the bid and whether the bid was submitted for the fabrication and delivery of the tonnage, or the fabrication, delivery and erection thereof, or the erection thereof only.

(2) Each such statement or copy shall be enclosed in a securely sealed envelope which shall bear a notation on the outside thereof showing the date of mailing or delivery of such envelope to the department of statistics, the location of the job on which the bid was submitted, a statement of the type of work sufficient to identify the job, the name of the owner or contractor to whom the bid was submitted and the name of the concern submitting the bid.

(3) All envelopes bearing on the outside thereof any indication of the tonnage of the job or the price bid shall be returned forthwith to the bidder unopened and no information concerning such tonnage or price shall be retained by the department or disclosed by it to any one.

(4) Except as otherwise provided in the foregoing paragraph 3, each bid envelope containing a statement or copy of a bid on any job that shall be deposited with the bid depositary as hereinbefore provided shall be retained unopened by the bid depository in a private and safe place and shall be opened only by the director of statistics and only after he shall have received notice in writing or by telegraph from the successful bidder on such job stating that the contract for such job has been definitely awarded to such bidder.

(5) After receipt of such notice the director shall open all envelopes so received and retained by him and containing statements or copies of bids submitted for the job on which such contract has been definitely awarded, and if envelopes have been received from more than one bidder, shall tabulate the various bids and shall mail copies of the tabulation thereof to each bidder which shall have deposited with the bid depository a statement or copy of a bid on such job. Such tabulation shall identify the several bidders as well as the job, and, with respect to the lowest bid submitted by each bidder, shall show the tonnage, the price and a statement as to whether such price covered only the fabrication and delivery of such tonnage or the fabrication, delivery and erection thereof, or the erection thereof only.

(6) If only one bidder shall have deposited with the bid depository a statement or copy of its bid on any job, each envelope containing any such statement or copy shall be returned unopened to the bidder who deposited it.

(7) If a contract for any job shall be awarded to any bidder other than those depositing their bids and the director of statistics can be definitely assured of the definite awarding of the job by the receipt of a signed written statement or telegram from the successful bidder or the buyer of such job, he may then open the envelopes containing the bids deposited and relating to such job and compile and distribute the bids in the manner provided in the foregoing paragraph 5.

(8) All opened statements or copies of bids shall be retained by the director for a period of six months after tabulation thereof.

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Fabricators Take Lead in Promotion of New Uses for Steel

PROMOTION of new uses for steel has been one of the principal purposes of the American Institute of Steel Construction since its inception. Under the direction of V. G. Iden, its present secretary, this function was not lost sight of, even during the darkest days of the depression. Particular interest was therefore attached to Mr. Iden's remarks concerning the nature of the propaganda favoring the use of steel which is being carried on by the institute.

"We must always keep in mind," said Mr. Iden, "that propaganda is successful only when it is planned with a view of appealing to basic motives. Self-preservation, ambition, pride, hunger, love of family, patriotism, are the motives which constitute the psychological raw materials of which we must be ever conscious if we are to win popular approval. Our object, therefore, is to formulate ideas of benefit to this industry that will be readily accepted by our public. Our ob-

Stability by Careful Cost Study ▲▲▲

jectives must be always within the public interest, otherwise our program is doomed to failure.

"No public relations program can hope to be successful unless it is integrated into the entire functioning of the industry. It cannot consist merely of releases from a mimeograph machine. It must be part and parcel of the thinking and action of the leaders in the industry.

"It is our province not merely to interpret our industry to our public, but to interpret our public to our industry. That is what is meant by enlightened self-interest.

"The old-time press agent sent pieces to the paper; the propagandist today may wage an entire campaign without sending a single release to the newspapers. The media are still important, and they may be utilized to the utmost, but they must be utilized with discrimination. Certain ideas are more effective when transmitted through certain media. A thousand people marching may be far more convincing than a thousand words. We must see that our industry is marching in unison and that all of us together are not only saying 'steel for strength and security,' but believing it also."

Urban Modernization Calls For Much Steel

Introducing the session devoted to promoting uses for steel, E. L. Shaner, editor, *Steel*, Cleveland, discussed the great possibilities offered to the industry by urban modernization. He pointed out that not only must large sections of our large cities be completely rebuilt along modern lines, but that the transportation services required by decentralization offer extended opportunities for the use of lightweight steel products in traction lines, buses and other forms of travel. Urban modernization naturally covers the field of dwelling construction, which Mr. Shaner touched on briefly.

As a practical method of achieving better treatment for industry at the hands of the Government, Mr. Shaner suggested that every owner of an industrial plant take occasion in the near future to invite his Congressman or Senator to visit his establishment. On such occasion, the importance of the plant to the community could be pointed out and the problems facing the industry discussed frankly.

Currently, the most talked-of outlet for steel awaiting development is the steel or steel-framed house. The extent of this market was definitely pictured by A. C. Shire, chief engineer, technical section, Federal Housing Administration, Washington. Mr. Shire estimated that in order to take care of the net increase in the number of new families alone, without allowing for replacements, more than 7,000,000 dwellings will be required in the next 10 years, almost 25 per cent of the total number now in existence.

In addition, Mr. Shire said, "conservative estimates based on the findings of the real property inventory and other recent surveys show that at least 10 per cent of all existing dwellings, or 3,200,000 family units, should be replaced immediately in the interest of the public health and welfare. Annual replacements of about an equal number will be needed to replace dwellings which become obsolete or unfit from year to year. When replacements to offset loss by fire are added in, a figure of 14,000,000 new dwelling units which will be needed in the next 10 years is reached.

"But suppose," said Mr. Shire, "that only 10,000,000 are built. I am told that the steel-framed dwelling would have four or five tons of steel on the average—let us say only four tons. There is a potential market for steel of 40,000,000 tons, an average of 4,000,000 tons a year. If only 25 per cent of these dwelling units are built with steel frames, you fabricators have a business of 10,000,000 tons in the next 10 years or 1,000,000 tons annually from residential construction alone. And the type of framing developed for this will be adaptable to thousands of other small structures."

Suggests Special Study by Institute

Further information regarding the steel-framed house market was offered in the report of the institute's committee on extended uses for steel, which was made by A. J. Dyer, Nashville Bridge Co., Nashville, Tenn.

"The institute in past years," said Mr. Dyer, "has collected much data on this subject. This information is sufficient to make clear that the problem is far from simple and that its solution might be greatly advanced if the steel industry as a whole could and would determine upon a national policy for the en-

NEW DIRECTORS ELECTED

Theodore A. Straub, Fort Pitt Bridge Works Co., Pittsburgh.

George Harris, Harris Structural Steel Co., New York.

J. H. Brillhart, Fort Worth Structural Steel Co., Fort Worth, Tex.

Directors Reelected for Three Years

H. B. Hirsh, Belmont Iron Works, Philadelphia.

R. P. Hutchinson, Bethlehem Fabricators, Inc., Bethlehem, Pa.

H. A. Fitch, Kansas City Structural Steel Co., Kansas City.

G. H. Blakeley, McClintic-Marshall Corpn., Bethlehem, Pa.

A. J. Post, Post & McCord, Inc., New York.

Charles N. Fitts, New England Structural Steel Co., Everett, Mass.

Officers Reelected

President, Clyde G. Conley, Mount Vernon Bridge Co., Mount Vernon, Ohio.

Executive vice-president, Robert T. Brooks, New York.

First vice-president, Clyde MacCornack, Phoenix Bridge Co., Phoenixville, Pa.

Second vice-president, H. A. Fitch, Kansas City Structural Steel Co., Kansas City.

Treasurer, A. J. Post, Post & McCord, Inc., New York.

Secretary, V. G. Iden, New York.

couragement of engineers and builders who are inclined to experiment with steel in house construction.

"The volume of steel used in any one house is too small to interest either a mill or a fabricator. Probably the volume of steel used in any one housing development would not offer any great profit to a single company, but the amount used in the aggregate throughout the country might well prove very attractive to the steel industry as a whole.

"Should the industry set up an agency to review the designs and plans of different builders, advise with them upon the practicability of their ideas and encourage them in the execution of those ideas, we would greatly hasten the day when steel would be more universally used in house building. This probably would require an addition to our engineering staff, and that might be warranted if we could count upon the support of the rolling mills who would most likely profit from this enlarged market.

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Technical Papers Cover Wide Range—Unit Stress Raised

OF considerable technical importance to the industry was the announcement that the directors of the institute have approved the recommendation of the committee on specifications that the allowable basic unit stress be increased from 18,000 lb. per sq. in. to 20,000 lb. Details of the change will be worked out by the committee as soon as possible and the move is expected to make possible a considerable reduction in the cost of steel construction.

F. H. Frankland, technical director of the institute, in reporting on the activities of the technical committee, announced that four district engineers have been added to the institute staff, occasioning the reopening of district offices in New England, Dallas, Tex., Atlanta, Ga., and St. Louis.

Since November, the district engineers have been continuously active in connection with the grade crossing and highway programs of the Federal Government which will require large structural tonnages.

Use of Steel In Dams

A comprehensive report on the use of steel in dam construction was made by Dr. Otis E. Hovey, consulting engineer, New York. Dr. Hovey pointed out that the use of steel has increased rapidly for many years for movable dams of all sorts but that its advantages in fixed dams have been almost entirely overlooked. As a result of Dr. Hovey's investigation of the subject, the institute has prepared a manual on the design, construction and maintenance of fixed steel dams which is now being distributed. Under the circumstances the subject is being touched upon here only briefly.

In enumerating the reasons why steel is a suitable material for fixed dams, Dr. Hovey mentioned the following:

(1) Steel is made and rolled at the mills and fabricated at the shops under full control. Inspection is practicable throughout all processes of manufacture, fabrication, and installation. There is no uncertainty concerning the uniform quality of the material or in its application in the structure.

(2) A steel frame dam can be designed so that its principal members resist the water pressure in the most direct manner and with no uncertainty as to their action. The loads on the foundations are definite. Consistent factors of safety against overturning and sliding can be maintained. Hydrostatic uplift, in general, does not require consideration. The steel must resist definite stresses and stability does not depend directly upon the weight of the steel but upon the arrangement of the frame.

(3) The upstream of the dam may be covered with steel plates designed for the actual stresses caused by the water pressure and made and installed so as to be thoroughly water-tight. This is readily accomplished by the old process of riveting and calking, or by the application of the more modern methods of fusion welding. At the bottom, sides, and ends of the dam the steel face plates can be designed and shaped to adapt them to serve as effective water seals when they are imbedded in concrete masonry. Such seals must be securely anchored to the foundations, for it is of the utmost importance that leaks be prevented along the bottom, sides, and ends of the dam.

(4) Steel dams can readily be designed to provide for expansion and contraction due to changes in temperature. The expansion joints should be made so that temperature changes will not cause stresses in the bottom, side, and end water seals that would tend to loosen them and cause leaks.

(5) Steel is an elastic material, hence a steel-frame dam is somewhat flexible and particularly adapted to withstand earthquake shocks and settlement of its foundations with a minimum of damage.

(6) A steel-frame dam, when properly designed, is of such construction that practically all parts are accessible for inspection, maintenance, and repairs.

(7) Where it is desired to make an earth, sand, gravel, or rock fill dam water-tight, a facing of steel plates on the upstream face of the fill is an obvious and probably the best and most ecanomical solution of the problem. In such a case the elastic flexibility of the steel is a particularly useful property, for, in case of settlement of the fill, the steel facing would be kept in contact with the fill by the pressure of the water, and for any ordinary settlement there would be little danger of damage to the face plates that would cause leaks.

(8) Where cut-off walls are required under fill, masonry, or steel dams, interlocking steel sheet piling offers an excellent and economical type of construction.

Clyde G. Conley, President, Mount Vernon Bridge Co., Mount Vernon, Ohio.

MR. CONLEY was reelected president of the American Institute of Steel Construction to serve for his fourth successive year. In recognition of his three years of service as head of the organization, the institute directors presented him with a beautiful watch at the final get-together dinner at White Sulphur Springs, Friday evening.

During the convention, Mr. Conley said: "It is an established fact that today the institute commands more respect from the industry, from the buyers of structural steel and from the mills producing plain material, than it has ever commanded during any year of its history." The truth of this statement cannot be questioned, and for this fact, much credit must go to Mr. Conley.

Little Attention to Research on Metal Structures

In a paper entitled, "How To Improve Steel Structures," H. L. Whittemore, chief, engineering mechanics section, Bureau of Standards, Washington, called attention to the fact that less attention is being paid in this country to research on metal structures than in any other branch of engineering.

(CONTINUED ON PAGE 80)

THIS WEEK IN WASHINGTON

Future perch for moribund Blue Eagle occupies attention of Washington taxidermists.

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Organized labor supports NRA revival with reservations.

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Steel producers are asked by NRA review division to provide data for complete study of industry.

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Allocation of funds for highway work and grade crossing elimination is now going forward rapidly.

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Iron and steel imports during September were the highest since September, 1933.

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BY L. W. MOFFETT

Resident Washington Editor, The Iron Age

o o o

WASHINGTON, Oct. 22.—Just as clear as mud, the question of further NRA legislation keeps bobbing up. . . . The President suggested further legislation at the next session of Congress in a message sent to Senator Pat Harrison, chairman of the Finance Committee, and Representative R. L. Doughton, chairman of the Ways and Means Committee on the eve of its recent adjournment. . . . But he said later that further legislation will not be necessary if industry itself eliminates unfair trade practices and chiseling. . . .

Maj. George L. Berry, NRA coordinator for industrial cooperation, sent out 5200 letters, followed by others, to industrialists inquiring if they would be willing to participate in Washington conferences "for the purpose of conferring upon the advisability of developing a permanent structure, contemplating the furtherance of prosperity and stability in our national life." . . . Expressing gratification at 700 replies, Major Berry said he had "no apprehensions" as to the success of the undertaking and that he believed a basis can be worked out for permanent legislation. . . .

Senator Harrison and Representative Doughton directed L. H. Parker, of the Joint Committee on Internal Revenue, to analyze available data from NRA studies. . . . Secretary of Commerce Daniel C. Roper said business must eventually take back its own responsibility "assumed by the Government" because of the emergency and that business must advise the Government of the help needed from the latter because the Government does not want "to meddle in or regiment business." . . .

James A. Emery, general counsel for the National Association of Manufacturers, told the American Institute of Steel Construction at White Sulphur Springs, W. Va., that industries should rely upon their respective trade associations and cooperate with the Federal Trade Commission, rather than accept any plan for revival of NRA to work out and maintain fair trade practices. . . . Major Berry, while saying he had "no wish to take the position of answering Mr. Emery or engaging in controversy with him," denied any plan to revive NRA, but raised the question of "whether voluntary trade associations and voluntary codes will be strong enough to drive cutthroat competition and the sweatshop operator from the business scene without legal authority to help." . . .

Put together, it all makes a more or less sweet potpourri. . . . And perhaps Secretary Roper, really sympathetic toward business, is right in saying the matter of further NRA legislation is up to business itself. . . . The suggestion, however, is made with reservation, because organized labor has such a strong voice in the New Deal. . . . But its efforts for legislation to license industry, like those for the 30-hr. week, will fall far short of their mark. . . . This is especially true with a Presidential campaign on, for whatever may be the belief that there should be further cracking down on business,

a breathing spell, if nothing more, is good politics pending the election. . . . At least this would seem to be sensible reasoning, though it may not be the reasoning of the official powers that be. . . . The qualification is made because of reports that the play will be to get the votes of labor and agriculture with only secondary consideration given to votes of business and industry. . . . Many New Dealers consider that the vast bulk of the latter are hopelessly lost to them despite what gestures may be made in the future toward business and industry. . . . But as to the suggested grouping of voters, there is, of course, no such segregation into definite classes. . . . Even organized labor never has voted en bloc; much less have business and agriculture. . . . And on various issues, organized labor and industry play the same hand, an outstanding example relating to tariff protection. . . .

Organized labor also sided with industry when at Atlantic City it turned thumbs down on a proposed amendment to the constitution to permit centralized control over industry. . . . In this it found itself in the strange position of opposing the New Deal if reports are true that the President favored endorsement of the amendment, despite the numerous tests about to come before the Supreme Court on the constitutionality of New Deal legislation. . . . Organized labor was smart enough to see that if Federal bureaucracy were to be further extended to give the Government control over industry, labor itself probably would be compelled to submit to Government regulation, and it might well think in the same direction with respect to its scheme for Government licensing of industry. . . .

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New Deal Feels Hurt

There is in the New Deal an element which professes to think industry and finance have entered into a cabal against it. . . . It opens the way for a great deal of talk, common to that spouted from soap boxes, that "big business" has organized for defeat of the New Deal and it goes over well in the hustings and radical quarters, though incoming reports indicate that the hustings are not taking it in so avidly as they have heretofore. . . . The New Dealers who complain of this so-called cabal resent that business and industry are so critical of the outpouring of billions of dollars on worthless, made "jobs" and think industry is purposely holding back in absorbing millions of the unemployed. . . . Hence, this is one reason for reluctance to admit that industry is doing its part, or, if admitting it at all, trying to give the Government credit for priming the pump. . . .

This attitude directs attention to critical remarks about industry made by Secretary of Labor Perkins last Thursday at Lansing, Mich. . . . American industry, she said, has shown "an unwillingness to cooperate with labor and meet it half-way" in efforts to set up adequate living standards and working conditions. . . . Labor was pictured as being not far from serfdom. . . . All this rabble rousing appeal reflects a sentiment in Washington that is widespread among many officials. . . . It shows that the distance between business and industry and the New Deal instead of being narrowed is widening despite the efforts of those who really want the "breathing spell" to mean something other than an empty promise. . . . One reason is of a practical nature. . . . It is the political pull that it is hoped the truce will give the New Deal. . . . But in the New Deal there are all sorts of temperaments and rugged individualists who insist upon the right of self-expression and in their own amateurish way while on political jaunts they engage in flatulent platitudes. . . . But few dimes, if any, do they give out of unearned, fat salaries to those for whom they weep so copiously. . . .

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Social Security

In her talk at Lansing last week, Madam Perkins referred to the New Deal social security program's goal as "a good life for the average man and woman." . . . The principles and purposes of the act have found general approval by industry though it is realized that the act will require considerable revision before it operates smoothly. . . . Certainly it lays a titanic job on employers of keeping records which must cover every employee as to earnings, kind of work, unemployment benefits, unemployment, etc. . . . Official rules and regulations relating to taxing provisions are being prepared to cover taxes employers will be required to pay beginning in 1936. . . . This tax will be 1 per cent of payrolls with payment due Jan. 31, 1937. . . . Old-age retirement taxes begin on that date. . . . Payroll taxes progressively increase to 2 per cent for 1937 and 3 per cent thereafter. . . . The Federal payroll tax is designed to compel States to establish their own unemployment benefit systems, under which employers can deduct up to 90 per cent of their Federal tax. . . . So far New York and Wisconsin are the only States having unemployment benefit acts. . . .

Financial state of the union: The Federal treasury put its deficit for the current fiscal year at $1,007,457,156 as of Oct. 14, skyrocketing from $687,211,671 on the same date in 1934. . . . The daily operating loss of the Government is a mere $9,500,000, which if continued, would mean a deficit of $3,477,000,000 at the end of the present fiscal year. . . . Soak the rich taxes will raise enough money in one year to run the Government 10 days. . . . The country is told no further taxes are in contemplation, believe it or not. . . . If not further taxes, what then? . . .

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Grade Crossing Elimination and Highway Project Program Under Way

The Bureau of Public Roads, Department of Agriculture, last week started the issuance of lists of grade crossing elimination and highway projects approved and contracted for as part of the $400,000,000 work relief fund set aside for these two activities, $200,000,000 for each.

Among the more important allocations and grade crossing elimination projects approved are the following:

Washington, allocation of $1,382,300, out of total of $3,095,041; main project $473,000, to reconstruct overcrossing on Northern Pacific railroad in South Seattle.

Rhode Island, allocation of $699,691, entire amount; chief project $280,000, for replacement of two overpass bridges in Providence on New York, New Haven & Hartford railroad.

District of Columbia, allocation of $220,000, out of total of $410,804, for grade separation on Pennsylvania and Baltimore & Ohio railroads.

North Carolina, allocation of $1,579,000, out of total of $4,823,958.

Florida, allocation of $1,084,000, out of total of $2,827,883, covering nine new grade separation projects, ranging from $73,000 to $165,000.

Montana, allocation of $723,000, out of total of $2,722,327; main project, $200,000, for construction of overpass in Butte on Northern Pacific.

Oregon, allocation of $1,624,791, out of total of $2,334,204.

Mississippi, allocation of $835,450, out of total of $3,241,475.

Wisconsin, allocation of $2,141,000, out of total of $5,022,683.

Nebraska, allocation of $1,128,000, out of total of $3,556,441; projects ranging from $7,000 to $112,000.

NRA Review Division Asks Steel Producers for Data To Make Study

WASHINGTON, Oct. 22. — Covering a wide range of practices and problems in the iron and steel industry, the Division of Review of the National Recovery Administration has sent out a questionnaire to individual manufacturers throughout the country. The information is sought as a part of the data being gathered in connection with the NRA steel study under the direction of R. W. Shannon. Iron and steel producers were assured in a covering letter by Mr. Shannon that when gathered the material will be used in such way as suggested by them so as not to identify any of the responding companies, many of which have already replied that the information will be supplied.

Embraced in the questionnaire are 13 main subjects. They include price discrimination, market demoralization, trade practices, jobbers' regulation, exports and imports, trade associations, interstate commerce, depreciation policy, labor, ore resources, limitations upon use of scrap, raw material assembly and costs and stock ownership.

In connection with price discrimination information is requested as to the most striking instances of secret and open discrimination occurring prior to and since operation of the code; why the practice is discriminatory; against what buyers it discriminates, and how it operates. Request is made to state circumstances in each case which might tend to justify or explain the discrimination, such as size of order, geographical location of purchaser, competitive position of purchaser in relation to others in the same business or operating capacity of the seller.

Opinion also is asked as to the merits of allowing discounts upon large quantity purchases and of charging extras for small quantity purchases, together with explanation of any difference in principles which may be believed to exist between allowing large quantity discounts and charging small quantity extras.

Why Market Demoralization

Seeking information with respect to market demoralization, description is asked of the system employed during the four years immediately preceding the effective date of the code for announcing prices. Likewise opinion of makers is asked as to the extent to which actual prices on specific products involved concessions from publicly known or announced base prices and extras during the four years immediately prior to the effective date of the code.

Attention is drawn to the fact that distinction must be made, for example, among prices in different marketing areas and among the practices of different types of companies. The extent to which price stabilization depended on active enforcement of the marketing provisions of the code is asked, as well as changes in prices since the expiration of the code and in what respect they may be assigned to its expiration. It is suggested that, concerning the relation of the code to prices, consideration be given, among other things, to the general levels of prices, including those of iron and steel as well as of other products.

With regard to trade practices makers are asked to give their opinion as to the effect of code provisions covering this subject upon pre-code conditions in the industry and also to describe benefits to themselves, the industry in general and consumers from the operation of any of those provisions, together with the effect on the same sources resulting from expiration of the provisions.

The effect of jobbers' regulations in the code in as far as they related to the granting of discounts upon pre-code marketing practices and upon the industry in general is asked. Inquiry is also made as to whether operation of the jobbers' regulations cause discontinuance of any sales outlets and, if so, how many and of what class.

Foreign Trade Results

The method of selling for export with changes in recent years, the basic reasons for exporting, effects of imports on steel code products during the life of the code and channels through which imports reach consumers are inquired about.

Trade association affiliations of steel and iron ore producers are called for, as are figures showing tonnage and value of steel code products which during 1934 were shipped in interstate commerce together with the total tonnage and value marketed in that year.

In view of the close relation between depreciation and profits, inquiry is made as to whether, as reported in financial publications, members of the industry have been surveying depreciation policies and practices for the purpose of revising them substantially, and, if so, the nature of such revisions and the reasons for them.

Labor Data Asked For

Dealing with the question of labor, information is sought as to pre-code, code and post-code hours and shifts; increase (if information is available) in productivity per wage earner in terms of finished product; effect, if any, on policy regarding employee representation, collective bargaining and union recognition by enactment of Wagner-Connery act; comparable figures regarding labor cost per ton of specific products over a period of years expressed either in absolute amount or as an index number; copies of working agreements and employee representation plan in effect at the present time including name and address of secretary of the employee organization, number and proportion of employees, if any, who were voting members of employee representation plan immediately prior to June 16, 1933, effective date of NIRA, Aug. 19, 1933, effective date of steel code, and May 27, 1935, date of Supreme Court decision holding NIRA unconstitutional. Description of any changes in employee representations plans prior to the first and to the last dates is asked.

Where there is ownership or other interest in iron ore reserves, request is made as to the estimated merchantable gross tonnage, how long it will last at the average annual rate of depletion for the years 1924 to 1934 and the geographical location.

Full Data on Scrap

Inquiries regarding scrap relate to general limitations upon its use in producing steel and pig iron; whether or not it is correct to assume that an increase in the use of scrap, up to certain limits, need not affect the quality of steel, and if so, whether there is any minimum percentage of pig iron which should be used with scrap; to what extent the competitive situation has been affected by the use of scrap; whether there are any pronounced differences in the extent to which plants in different geographical areas use scrap and if so why the differences exist; what effect, if any, do depression and prosperity tend to have upon the use of scrap; attitude toward exportation of scrap; views as to whether there should be any concerted effort toward fuller utilization of scrap resources to retard depletion of domestic reserves of merchantable iron ore, and suggestions as to plan or method appropriate to stimulate such fuller

(CONTINUED ON PAGE 81)

NEWS OF THE WEEK

Armco Wins Prize For Sales Exhibit

AT the industrial exhibit of the Purchasing Agents Association of Pittsburgh, Oct. 10 and 11, the American Rolling Mill Co. was awarded a beautifully engraved silver plaque for having displayed the most informative exhibit at the convention. Sixty-nine exhibitors competed for this prize.

On a seven-sided table in the exhibit were mounted sample sheets of the following: galvanized Armco Ingot Iron, Armco enameling iron, hot-rolled steel, cold-rolled steel, stainless steel, electrical sheet steel and spiral welded pipe. Above each of these samples appeared a short caption explaining the applications of each sheet, and on top of the table in the respective sections, products were displayed to demonstrate these applications. The table revolved continuously, telling its story with every revolution.

Supplementing this central attraction, as a part of the interesting background, were photo-enlargements of large and small Armco coils, mounted on a blue panel which balanced an identical panel on the opposite side bearing samples of all six finishes of Armco Stainless Steel.

Westinghouse Profits Rise Sharply

WESTINGHOUSE ELECTRIC & MFG. CO. in the third quarter had a net profit of $2,557,452, compared with net loss of $332,062 in the like quarter last year. Orders booked in the 1935 quarter were 21 per cent higher than those in the same quarter in 1934. Sales billed were 24 per cent higher.

For the nine months ended Sept. 30 company reported net profit of $8,822,640, contrasted with net loss of $363,787 in the first nine months of 1934. Orders received during the nine-month period were 20.7 per cent higher than those in 1934, while billings were 32.9 per cent higher.

Slum Clearance Projects Go Forward

BIDS for the construction of $14,250,000 worth of PWA slum clearance and low-rent housing projects were invited last Wednesday by the Housing Division of PWA. The bids will cover construction work on seven projects. At the same time the Housing Division asked bids for demolition of the slum area to be replaced by the $6,500,000 Cincinnati low-rent housing project.

The eight projects are:

Atlantic City, N. Y.—Construction bids for Stanley S. Hommers village, for which $1,700,000 has been allotted; bids to be opened Nov. 12.

Charleston, S. C.—Construction bids for foundation of 39 buildings of the $1,150,000 Meeting Place project; bids to be opened Oct. 30.

Chicago—Bids for demolition of existing structures and construction of foundations for Jane Addams $1,500,000 housing project; bids to be opened Oct. 28.

Chicago—Bids to cover demolition of existing structures and construction of foundation for Diversey $6,000,000 housing project; bids to be opened Oct. 30.

Dallas, Tex.—Bids for construction of foundations for 28 buildings included in the $900,000 housing project; bids to be opened Oct. 30.

Jacksonville, Fla.—Bids for construction of foundations for 41 buildings in the $1,000,000 Durkeeville project; bids to be opened Oct. 31.

Omaha, Neb.—Bids for construction of foundations of the $2,000,000 North Side Omaha housing project; bids to be opened Oct. 31.

Cincinnati—Bids for demolition of 24-acre slum, to be replaced with a $6,500,000 housing project; bids for construction to be asked soon.

Jessop to Produce Mogul Steel

THE Jessop Steel Co., Washington, Pa., has announced that, under a license agreement with the Cleveland Twist Drill Co., Cleveland, holder of patent covering Mo-Max type of molybdenum high-speed steel, it is producing the same type of steel under the trade name of Mogul. This steel entails the use of only a small quantity of tungsten and of relatively high amounts of molybdenum.

R. Edson Emery, president of the Jessop company, in making the announcement pointed out that of vital importance to American industry is the location in the United States of the largest known deposits of molybdenite, from which ferro-molybdenum is made.

In the event of war between other nations, the United States would not be dependent upon the import of this material, as is the case with tungsten, and production of molybdenum high-speed steel would not be interrupted for lack of raw materials. Moreover, the small amount of tungsten contained in this steel can be supplied by American mines. During the World War, an acute shortage of tungsten seriously hindered the production of ordinary tungsten high-speed steel.

Bethlehem Publishes Valuable Handbook

A HANDBOOK which is in reality almost a textbook on the production and properties of all types of alloy and special steels has just been published by Bethlehem Steel Co. This 376-page publication is designated as Catalog No. 107, and the contents thoroughly span the history of modern alloy and special steels. The data therein is designed to give con-

sumers of these steels dependable working data on properties and performance and to bring all pertinent existing data on these steels up-to-date in one complete volume.

One of the distinctive features of the handbook that will prove extremely valuable to steel treaters is the color charts of heat colors and temper colors. On these charts the colors have been reproduced with unusual fidelity, corresponding to the actual colors observed on pieces of steel under accurate temperature control.

The Bethlehem Steel Co. is making no effort to distribute the book to the trade. However, a copy may be obtained for a nominal sum by writing directly to the company at Bethlehem, Pa.

Bethlehem Handbook On "Steel Plates"

A 362-PAGE ready-reference handbook, for designers, fabricators, engineers and consumers of steel plates and flanged-plate products is published by Bethlehem Steel Co., Bethlehem, Pa. In it the subject-matter is technically, though simply, treated from details of manufacture in a word-and-picture story to the various applications of these products in tanks, stills, pressure vessels, cars, locomotives, ships, barges, boilers, buildings, bridges, etc., and many special applications.

The primary purpose of this thoroughly modern handbook is to provide, in one complete volume, all the necessary working data, such as tables, specifications, general engineering and metallurgical information, helpful to designers, fabricators, and other users of steel plates, flanged-plate products and tubes.

Under each of its five main divisions is correlated all the pertinent data thereto, making it unnecessary to refer to other sources for specific information: Part I is concerned with manufacture, specifications, tabulated data and applications; Part II covers flanged and dished heads; Part III deals with tubes; Part IV takes up boiler design, riveted joints, welding, etc.; Part V includes indispensable engineering tables, such as functions of numbers, natural trigonometric functions, and so on. And for convenient recording of data for future reference, blank cross-section sheets are inserted next to the index.

This copyrighted volume is made up in fabrikoid covers, 6½ x 9¼ in., with title and trade-mark lettering stamped in gold. Price, $1.

British Pig Iron Buying Active for Future Delivery—Steel Mills Busy

LONDON, Oct. 21.—(*By Cable*)—Pig iron consumers are eager to place orders for far forward deliveries owing to fears of higher prices and the possibility of a shortage of supplies, but makers are adopting a cautious attitude. Current output is being fully absorbed.

Semi-finished steel output is approaching record levels, but makers are still unable to keep pace with demand, especially for prompt parcels and the import quota increase suggested. Demand for structural steel is increasing and rail and plate mills are busier. Most steel works are well booked for several months ahead.

Wales and Germany have exceeded the tin plate export quotas, and with steel tending upwards, tin plate prices have advanced. Export demand is now more quiet, but home business still is good.

September exports of pig iron were 11,900 tons of which 67 tons was shipped to the United States. Total exports of iron and steel were 187,000 tons.

Continental iron and steel markets show that improvement is maintained, and overseas buyers apparently are covering themselves anticipating international complications. Sweden, Holland, the Near East, India and Argentina are buyers and Japan is taking finished steel and China, crop ends. Bars, profiles, plates and sheets are most active with semi-finished steel quiet.

The Belgian works are busy and are diverting orders to French works.

F.o.b. works port, black sheets 24 gage, £9 10s; galvanized sheets, 24 gage; £11 10s. Continental gold prices unchanged.

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton

Ferromanganese, export	£9		
Billets, open-hearth	£5 10s.	to	£5 15s.
Tin plate, per base box	18s. 9d.	to	19s. 3½d.
Steel bars, open-hearth	£7 17½s.		
Beams, open-hearth	£7 7½s.		
Channels, open-hearth	£7 12½s.		
Angles, open-hearth	£7 7½s.		
Black sheets, No. 24 gage	£9 10s.		
Galvanized sheets, No. 24 gage	£11 10s.		

Official Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £

Current dollar equivalent is ascertained by multiplying gold pound price by 124.14 to obtain franc equivalent and then converting at present rate of dollar-franc exchange.

Billets, Thomas	£2 7s.		
Wire rods, No. 5 B.W.G.	£4 10s.		
Steel bars, merchant	£3 5s.		
Sheet bars	£2 8s.		
Plate, ¼ in. and up	£4 2s.	6d.	
Plate, 3/16 in. and 5 mm.	£4 4s.	8d.	
Sheets, ⅛ in.	£4 9s.	8d.	
Beams, Thomas	£3 2s.	6d.	
Angles (Basic)	£3 2s.	6d.	
Hoops and strip base	£4 2s.	6d.	
Wire, plain, No. 8	£5 7s.	6d.	
Wire nails	£5 15s.		
Wire, barbed, 4 pt. No. 10 B.W.G.	£8 15s.		

Contracts Let for Homestead Plate Mill

THE Carnegie-Illinois Steel Corpn. has awarded contract to the American Bridge Co. for the fabrication and erection of the building which is to house the new 100-in. semi-continuous sheared plate mill at Homestead, Pa. The design of the building is 60 per cent complete and erection is to start about Jan. 15, with completion expected by May 30, 1936. The Carnegie-Illinois company is now taking bids on electric cranes, reheating furnaces, furnace tables, charging and discharging machinery, mills, mill tables, main motor drives, control equipment, shears, gages and plate levelers. The building will require also about 15,000 tons of castings and forgings; 12 overhead cranes ranging from 10 to 100 tons capacity, 600 tons of pipe and fittings, and 8000 ft. of standard gage track.

General Electric Sales Higher

SALES billed by the General Electric Co. during the first nine months of 1935 amounted to $149,173,275, compared with $121,735,122.98 during the corresponding period last year, an increase of 23 per cent. Profit available for dividends on the common stock for the first nine months of this year was $17,205,332, compared with $11,714,247 for the first nine months of last year. This profit is equivalent to 60c. a share for the first nine months of 1935 and 41c. a share for first nine month of 1934.

PERSONALS

J. HALSEY MCKOWN, who has spent his entire business career with the Carnegie Steel Co. in various sales capacities in the general offices and in the St. Louis and Detroit district offices, has been appointed assistant vice-president of the Carnegie-Illinois Steel Corpn. He went to the Detroit office after two years in the Army during the world war, and held various positions at that office, being assistant manager of sales there when transferred to Pittsburgh three years ago. Prior to his recent appointment he had been manager of sales, bar, strip and semi-finished material division at Pittsburgh.

GRISWOLD A. PRICE, who has succeeded Mr. McKown as manager of sales bar, strip and semi-finished division, formerly was in charge of the same department of the Illinois Steel Co. at Chicago. He joined the Illinois company after being graduated from Northwestern University, serving in various capacities in the operating and sales department. He became manager of sales for the company at St. Louis and was transferred to Chicago this year to take care of the bar, strip and semi-finished division of the general sales department.

A. H. WARREN, JR., who has been appointed manager of sales, structural and plate division at Pittsburgh, was formerly manager of sales of the Illinois Steel company's district office at St. Paul, Minn. After leaving the University of Minnesota, he was employed by the Illinois company in the St. Paul sales office, serving in various capacities, interrupted only for the duration of the world war.

ROBERT A. MARBLE, who has served with the Carnegie Steel Co. for more than 29 years, has been appointed manager, sales engineering division, Carnegie-Illinois Steel Corpn., with headquarters at Pittsburgh. He is a graduate of Brown University.

Additional appointments in the Carnegie-Illinois Steel Corpn. made effective on Oct. 1 were: O. M. HAVEKOTTE, credit manager, Pittsburgh district, and C. T. SIEBERT, JR., assistant credit manager, Pittsburgh district; N. E. CRULL and F. H. BECKER, credit manager and assistant credit manager, Chicago district.

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EDWARD R. WEIDLEIN, head of the Mellon Institute of Industrial Research, will be presented with the Chemical Industry Medal of the Society of Chemical Industry, at a meeting of the society on Nov. 8 "in recognition of the valuable applications of chemical research to industry that have been carried on under his direction."

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DAVID T. MARVEL has been transferred from the Canton office of the Timken Steel & Tube Co. to the Chicago office as sales representative and assistant to E. F. TALMADGE, and C. SIDLEY CRAINE goes to the Detroit office as sales representative and assistant to R. ATKINSON.

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R. L. KENYON, supervising research engineer in charge of methods of physical testing and development in the research laboratories of the American Rolling Mill Co., Middletown, Ohio, has been placed in charge of all metallurgical work in the manufacture of wrought steel wheels.

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J. EDWARD GRINFIELD-COXWELL, steel mill representative, Boston, will leave early in November for an extended trip to Australia. He plans to return in April.

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C. G. CUNNINGHAM, who since 1928 has been Pittsburgh sales manager for the Pratt & Whitney Co., has been made Chicago sales manager. He was associated with the Hartford Empire Co., Hartford, Conn., from 1912 to 1920. He later became chief engineer and general superintendent of the United States Glass Co., and subsequently erection engineer for the American Mond Nickel Co., Clearfield, Pa., a subsidiary of International Nickel Co. In 1927 he joined the Pratt & Whitney organization.

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EWERS P. ALDREDGE, formerly assistant manager of the Vandergrift, Pa., works, American Sheet & Tin Plate Co., has been appointed manager of the company's plant at Monessen, Pa. He previously served also at the company's Laughlin plant at Martins Ferry, Ohio, and at New Castle, Pa., and Chester, W. Va.

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ADDIS E. MCKINSTRY, who retired from the presidency of the International Harvester Co. last May, has been elected chairman of the executive committee, which was formerly known as the finance committee.

J. H. McKOWN

G. A. PRICE

A. H. WARREN, JR.

R. A. MARBLE

NORMAN I. STOTZ, who has been general superintendent, Braeburn Alloy Steel Corpn., Braeburn, Pa., has resigned to become associated with Cyclops Steel Co., Titusville, Pa., in a metallurgical capacity. He had served the Braeburn company for 14 years. For two years he was chairman of the Pittsburgh chapter of American Society for Metals.

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H. M. NORTHRUP has been appointed chief engineer of the Hudson Motor Car Co., Detroit. A graduate of the Michigan College of Mining and Technology, he joined the Hudson company in 1919 and a year later was given charge of a special department taking care of all physical, chemical and metallurgical experimental work and also of all inspection of production materials. In 1929 he became assistant chief engineer. In his new capacity he will operate under S. G. BAITS, vice-president and assistant general manager, who for many years was Hudson's chief engineer.

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ROY M. ATWATER, formerly associated with the W. S. Rockwell Co., and more recently with the General Alloys Co., has joined the Salem Engineering Co., Salem, Ohio, as sales engineer.

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DR. JOHN F. THOMPSON, vice-president, International Nickel Co., of Canada, Ltd., sailed for France, Oct. 9, where he will be chief delegate of the Mining and Metallurgical Society at the seventh International Congress of Mines, Metallurgy and Applied Geology and a member of the delegation from the American Institute of Mining and Metallurgical Engineers. He will present a paper on "Ten Years' Progress in the Metallurgy of Nickel."

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WILLIAM M. BLACK, since 1934 general sales manager of the American Manganese Steel Co., Chicago Heights, Ill., has been elected vice-president in charge of sales. He first entered the employ of the company in 1912 in the training course offered by the company. Later he joined the sales department and shortly after was placed in charge of the Pittsburgh office. In 1927 he became eastern sales manager at New York and continued in that capacity until his promotion to the sales managership in 1934.

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MARCUS J. AURELIUS, who has had a varied sales experience with the Colorado Fuel & Iron Co., Denver, Colo., has been made district manager of the newly-opened Chicago office of the company at 602 Railway Exchange Building.

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KENNEDY BEESON has been appointed manager of manufacturers' products sales, Pittsburgh Steel Co., Pittsburgh. He has been associated with the company for the past five years, serving first in the production end and later in sales capacities.

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W. J. GEORGE has been appointed assistant sales manager of Edgewater Steel Co., Oakmont, Pa. He has been associated with the company for more than 18 years, serving in both the operating and sales departments.

ROBERT L. BALDWIN has been made sales development manager of the electrode division of National Carbon Co., Inc., and is devoting his entire time to development problems. He brings to this work 25 years of close association with the electrode and electric furnace industries. After spending several years with the United States Steel Corpn. in connection with work on the Heroult electric furnace, he was for 15 years sales manager of Republic Carbon Co. and recently sales manager of Republic Division of National Carbon Co., Inc. He will continue to maintain his office at Niagara Falls, N. Y.

Institute Names Verity Vice-President

George M. Verity, chairman of the board, American Rolling Mill Co., who recently resigned as a member of the board of directors and the executive committee of the American Iron and Steel Institute after having served the institute many years, has been elected honorary vice-president of that organization.

This action was taken by the board because of their very sincere appreciation of the devotion which Mr. Verity has shown to the interests of the institute and the steel industry as a whole, and the help and support which he has given so freely to all the work of both the board and the executive committee.

W. M. BLACK

M. J. AURELIUS

OBITUARY

FRANK A. HATCH, president of Shepard Niles Crane & Hoist Corpn., Montour Falls, N. Y., died at his home there on Oct. 15. He was born in Bay City, Mich., Nov. 2, 1877, and was graduated from

F. A. HATCH

the University of Michigan in 1900. Three years later he went to Montour Falls as treasurer of the Pneumatic Tool Co. and in 1917 he became vice-president and general manager of its successor, the Shepard Electric Crane & Hoist Co. In 1929 he was elected president and a member of the executive committee of the Shepard Niles Crane & Hoist Corpn. He was also a director of Niles-Bement-Pond Co.

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PHILIP WICK, who had long been identified with the steel industry in Youngstown, died Oct. 12, aged 49 years. His death followed an operation which he underwent six weeks ago. Mr. Wick, who was a member of a prominent industrial family in Youngstown, was a graduate of Sheffield Scientific School of Yale University. He was connected for a time with the former Gary Iron & Steel Co. in Cleveland and later organized the Youngstown Securities Co. and Wick & Co., brokerage firm, which afterwards became Butler, Wick & Co. He had served as a director of the Republic Steel Corpn., Youngstown Sheet & Tube Co., and of two Youngstown banks. He was a trustee and vice-president of the Y. M. C. A. in Youngstown and a trustee of the Youngstown Foundation.

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W. A. CHILD, secretary of the Ontario Rolling Mill Co. and treasurer of the Hamilton Steel & Iron Co., Hamilton, Ont., died on Oct. 15, aged 73 years. He was born in Mayville, Wis., on July 23, 1862. Following his graduation from Kenyon College, Gambier, Ohio, he became identified with the steel industry in Ohio, later entering the industry in Canada.

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CHARLES M. POWER, sales manager, Cleveland Chain & Mfg. Co., died Oct. 15 in an Akron hospital as a result of injuries received a few days before in an automobile accident. He had been connected with the Cleveland company 10 years and previously was general manager of the Seneca Chain Co., Kent, Ohio.

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G. S. WORTLEY, sales manager of the Imperial Electric Co., Akron, Ohio, for the past 22 years, died on Sept. 13.

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JOHN D. ROBINSON, who had recently been appointed assistant credit manager for Carnegie-Illinois Steel Corpn. in the Pittsburgh district, died suddenly on Oct. 17. He had served in the credit department of Carnegie Steel Co. for 23 years, having started as a clerk in 1912.

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THATCHER HOYT, a veteran iron and steel broker, died Oct. 11 at his home in Chicago.

Cast Iron Pipe

Milwaukee has low bid from United States Cast Iron Pipe & Foundry Co. on 500 tons of 12-in. class C pipe.

Ishpeming, Mich., has plans for water distribution system to cost $169,000. Gunnard Anderson is city engineer.

Pittsville, Wis., has plans by Druar & Milinowski, 830 Globe Building, St. Paul, Minn., for new waterworks system costing $50,000. S. E. Werner is city clerk.

Burlington, N. C., closes bids Oct. 28 for about 5600 ft. of 12-in. for main water supply, and for about five tons of cast iron specials. A. C. Linberg is city engineer.

Tawas City, Mich., plans pipe lines for water supply. Bond issue of $32,000 has been authorized for this and other waterworks installation.

Eustace, Tex., plans about 8700 ft. of 1½ to 8-in. for water system. Fund of $25,000 has been arranged through Federal aid for this and other waterworks construction, including pumping station. F. J. Von Zuben, Electric Building, Fort Worth, Tex., is consulting engineer.

Clayton, N. M., plans water pipe lines. Fund of $80,000 has been secured through Federal aid for this and other waterworks installation.

Newmarket, Ind., plans early call for bids for about 9100 ft. of 4 and 6-in. for water system; also for 50,000-gal. elevated tank and tower, pumping machinery and accessory equipment. Municipal Engineering Co., Plainfield, Ind., is consulting engineer.

Vine Grove, Ky., asks bids until Oct. 29 for pipe for water system; also for filter plant equipment and other waterworks equipment. Westcott & Thornton, Cary Building, Owensboro, Ky., are consulting engineers.

Cunningham, Kan., closes bids Nov. 1 for pipe for water system and other waterworks installation. Cost about $36,000. Financing has been arranged through Federal aid. Hefling & Hughes Engineering Co., 20½ West Second Street, Hutchinson, Kan., is consulting engineer.

Union Gap, Wash., will soon take bids for pipe for water supply, including 18,040 ft. of 4, 6 and 8-in.; also for pumping machinery and other waterworks equipment. Financing has been arranged through Federal aid. G. D. Hall, Court House, Yakima, Wash., is consulting engineer.

Bowie, Tex., asks bids until Oct. 28 for about seven miles of various sizes for main water supply and distribution lines; also for pumping station, filter plant and other waterworks equipment. Fund of $164,000 has been secured through Federal aid. Municipal Engineering Co., Athletic Club Building, Dallas, Tex., is consulting engineer.

Lathams Water District, Newtonville, N. Y., will take bids soon for pipe for water supply and other waterworks installation. Fund of $63,600 has been arranged through Federal aid. Solomon & Keis, 257 Broadway, Troy, N. Y., are consulting engineers.

Elk City, Okla., will soon take bids for pipe for water system; also for other waterworks installation, including reservoir. Fund of $350,000 has been arranged through Federal aid. E. T. Archer & Co., New England Building, Kansas City, Mo., are consulting engineers.

Murdock, Minn., will take bids early in November for about 12,000 ft. of various sizes for water supply; also for 50,000-gal. elevated steel tank and tower, centrifugal pumping machinery and accessories. Fund of $30,000 has been secured through Federal aid. Ealy H. Briggs, 1957 University Avenue, St. Paul, Minn., is consulting engineer.

Steel Imports Are Highest Since 1933

WASHINGTON, Oct. 22.—The highest since September, 1933, imports of iron and steel into the United States in September of the current year totaled 53,158 gross tons, a decline of 2548 tons from incoming shipments in the same month of two years ago, but an increase of 112 per cent over September of last year. The gain over August, with a total of 31,312 tons, was 70 per cent.

The chief imports in September consisted of 14,357 tons of pig iron and 11,226 tons of scrap. The heaviest incoming movement of pig iron was from the Netherlands, 5782 tons, while India ranked second with 5227 tons, and Germany third with 2538 tons. Virtually the entire movement of scrap came from Canada with 11,126 tons. Imports of cotton ties rose to 2347 tons in September from 1000 tons in August. Germany was credited as the source of 796 tons and the Netherlands of 158 tons in September though both movements are believed to have originated in Germany. Of imports of 2766 tons of structural shapes in September, 2544 tons came from Belgium, of which 2494 tons was plain material. Imports of hoops and bands were 2525 tons of which 1619 tons came from Germany and 472 tons from France.

Valley Operations Benefit from Upturn In Sheet and Tin Plate Business

YOUNGSTOWN, Oct. 21.—An increase in flat-rolled steel orders and a surprising spurt in tin plate business are the chief sponsors for brisker activity in the Valleys this week. It is difficult to place a finger on any significant increase in orders from the automotive industry, although strip bookings and releases for motor car consumption are heavier. Calls for forging bars also are more frequent. The lift in tin plate orders has received its primary impulse from general line can requirements of a large can maker. The Republic Steel Corpn. has scheduled its tin plate mills this week at around 85 per cent, and may hold that rate for another week.

Valley steel producers apparently have caught the optimistic spirit that permeates the Detroit automotive industry, and expectations are rife that automobile steel will be ordered in substantial tonnage within a short time. But raw steel output is being gaited pretty closely with finished steel demand, and production in the current week will advance moderately, probably to around 58 or 59 per cent. With miscellaneous business continuing in steady, substantial volume, part of current ingot output is for conversion into semi-finished stocks in anticipation of a quick expansion in automobile steel demand.

The Youngstown Sheet & Tube Co. still is operating 11 out of 12 open-hearths at its Campbell works, with the Brier Hill plant remaining idle. The Carnegie Steel Co. is running 12 out of 15 open-hearths at the Ohio works and six out of 12 open-hearths at the Farrell plant. The Republic Steel Corpn. has scheduled nine open-hearths at Youngstown, seven out of eight at Warren, three out of nine at Canton, and five out of 10 at Massillon. The Sharon Steel Hoop Co. has four out of six open-hearths active at Lowellville. All three Bessemer plants in the district are in operation.

Although thus far this season steel orders have not followed customary seasonal trends, there is some conjecture as to the eventual behavior of demand for steel entering into consumers' goods, which normally enjoy a heavy holiday trade, in the face of an expected intensive sales drive for retail trade by the automobile industry.

The heavier lines of steel products are not sharing the improvement in other items. Although the daily volume of releases for standard pipe is showing up better than it did several months ago, aggregate movement of tubular goods out of this district is still abnormally low. Until substantial line pipe tonnage finds its way on to order books, the heavy pipe capacity in the Valleys will be only moderately engaged. The increase in demand for hot-rolled bars from forging shops has not offset a natural drop in general orders, following the establishment of the 1.85c. base on Oct. 1. The semi-finished market also is a bit sluggish as a natural aftermath of fairly heavy anticipatory buying last month. Forging quality billets, which were advanced $3 a ton, have not yet been tested at the new quotation, only a few spot orders for small lots having been placed since Oct. 1. Lack of heavy demand from the railroads and the construction field still leaves a large gap in mill rolling schedules here.

Consumers, rather than producers, are speculating as to the trend in pig iron prices, and contracting for 200 and 300-ton lots for delivery by Dec. 31 has increased perceptibly. Part of the increased demand is traceable to slightly heavier foundry melt. Valley pig iron makers still are not certain as to when and if the heavier fuel costs will be reflected in pig iron quotations, which are quite generally certain to remain unchanged until the end of fourth quarter.

The scrap market is relatively quiet. No. 2 heavy melting steel is fairly strong, a recent purchase having been made at $13.25, delivered.

Any effects of the Italo-Ethiopian warfare on the Valley industrial activity are only vaguely evident. Demand for coke by-products, such as nitration benzol and toluol, has increased measurably from a few scattered sources. Toluol, the base used in making TNT, is being inquired for for export, but local steel producers with coke by-product outlets are able to meet only domestic demand. Indirectly as a result of the foreign conflict pure benzol and 90 per cent benzol have been advanced 3c. a gal. to 18c., delivered.

Raw Materials of Steel Require Much Labor

FOR every 10 men employed directly in the manufacture of steel, five are working to supply them with raw materials, the American Iron and Steel Institute has estimated from a study of 10 of the leading steel corporations. Many additional men are employed in the fabrication of countless thousands of articles made from steel and iron.

The 10 corporations studied are completely integrated from ore mines to finishing mills, and operate 26 pig iron and steel producing companies.

Last year the companies produced for sale in the United States a total of 15,206,562 gross tons of rolled iron and steel and 1,548,547 gross tons of pig iron, more than 71 per cent of the total production of the industry.

More than 835,600,000 man-hours of work in iron and coal mines and limestone quarries, on boats and railroads, as well as in the steel mills themselves, were created as a result of the production of this tonnage of pig iron and rolled iron and steel by the companies last year, it is estimated. This number of man-hours would afford employment for an estimated 523,000 men on the basis of the average number of hours worked by employees of the steel industry last year.

Manufacturing operations within the steel plants, from the production of pig iron and steel to the rolling of the finished product created almost 555,000,000 man-hours of work, equivalent to employment for approximately 343,000 men.

Mining the iron ore and coal and quarrying the limestone consumed by the companies required an estimated 126,100,000 man-hours, work for approximately 81,000 men, while an additional 129,725,000 man-hours, requiring about 83,000 men, were needed to transport the raw materials to the mills by boat and train. More than 24,730,000 man-hours, representing work for about 16,000 employees, were necessary to convert coal to coke for use as fuel in blast furnaces.

Total payrolls of the corporations covering all units, including those producing such raw materials as iron ore, coal and limestone, aggregated $435,160,421 in 1934.

This sum is 59.7 per cent of the total of $729,180,400 which was received last year from the domestic sale of the iron and steel produced by the several corporations.

Artificially High Wage Rates Lead To Unemployment and Lower Incomes

PROLONGED unemployment and reduced annual incomes of workers are both due primarily to wage rates artificially maintained above the general price level. This is the substance of a recent study by Allen W. Rucker and N. W. Pickering entitled "The Penalty of Unbalanced Wages and Prices," published by Farrel - Birmingham Co., Inc., Ansonia, Conn.

As developed by the authors, the argument hinges upon two fundamental economic laws, that a worker's annual income depends upon his productivity, and that wages must balance with prices in order for the laborer to subsist. Demonstration of these essential principles is worked out in a series of five charts, based on official records, and showing, in effect, the unusual correlation existing between wage rates and prices, and physical output of factories and employment. So automatically do these laws operate that, regardless of time and event, the outcome is inevitably the same.

"Every increase in the hourly wage rate, relative to the general price level," says the study, "created fresh unemployment, good years and bad alike. In the seven years after 1926, 809,000 or 44.9 per cent of railway employees lost their jobs, while hourly wage rates were being raised 46 per cent above the general price level as measured by the United States Bureau of Labor index.

"Anthracite coal prices, largely determined by prevailing hourly wage rates, reached a peak in 1933 of 44 per cent above the general price level — coincident therewith employment fell to 47 per cent below 1929.

"The official figures show that factory employment, as reported by the Federal Reserve Board for 1934, averaged 28 per cent below 1929, almost exactly equal to the approximate 29 per cent by which factory wage rates were above the general price level for 1934."

It follows quite naturally that much of the doctrinaire regimentation of the New Deal, artificially conceived and executed, reacted directly to the detriment of the laboring classes it proposed to benefit, according to the study. But industry and labor alike lose when maladjustment comes into play, and radical legislation, issuing from a centralistic Federal bureaucracy, is practically synonymous with such maladjustment. Unionism is no better. In fact, artificial attempts to circumvent the ply and stress of economic law can never be successful. The depression, with its attendant sore spots of unemployment and reduced annual earnings, has been intensified and prolonged by unsound curative measures.

Underlying the American system, it is contended two laws are in force. "The annual income per average worker is directly and almost uniformly proportionate to the productive values he creates—regardless of union membership, minimum wage laws, political administrations, or booms and depressions"; and "whenever the hourly wage rate is forced above the current general price level, the inevitable result is a decline in the annual income per worker and a reduction in the employment in the industry affected." Reduced working hours limit a worker's productivity, and consequently his annual income declines purely because he then does not work long enough to produce the values needed to pay the income he requires. Likewise, increased wages increase the selling prices of the goods made, and thus reduce the demand. As demand declines, so does employment.

The balance must be maintained. When it fails, loss of employment and sacrifice of income are the penalties.

Acetylene Group to Meet at Cleveland

A COMPLETE program of papers and technical committee reports has been arranged for the thirty-sixth annual convention of the International Acetylene Association, to be held at the Hotel Cleveland, Cleveland, Nov. 12-15.

Papers will include: "Welding and Cutting of High Chromium Steels," by W. J. Priestley, vice-president, Electro Metallurgical Co.; "Further Studies of Oxy-Acetylene Cut Steel Plate," by Prof. J. H. Zimmerman, Massachusetts Institute of Technology; "Remarks on Welding Class I Pressure Vessels," by G. W. Plinke, engineer, Henry Vogt Machine Co.; "High Pressure Piping," by J. A. Freiday, Thomas E. Murray, Inc.; "Shape Cutting of Locomotive and Car Parts," by James Grant, Atlantic Coast Lines, and "Maintenance-of-Way Problems in High-Speed Transportation," by Armstrong Chinn, Chicago & Alton Railroad. The industrial drama, "Profits of Progress," that was a feature of the last annual meeting, will be repeated by request. H. F. Reinhard, 30 East Forty-second Street, New York, is secretary of the association.

New Application For Steel Piling

STEEL piling clusters being used by the S. & W. Construction Co., Memphis, Tenn., in building a warehouse unloading dock at Memphis for the Jones & Laughlin Steel Corpn. mark a newly developed application for steel piling in harbor and dock improvements and shore protection work along inland waterways.

The design of these units is a complete departure from the usual wood pile cluster in that the construction is of steel piling driven in the form of a cylinder and filled either with concrete or sand and gravel. In this particular project, a J. & L. section is being used. The cylinders are 7 ft. 1½ in. inside diameter and are to be filled with sand and gravel. They are being constructed on the up-stream side of two existing concrete foundations of an overhead crane runway. In this location they serve a double purpose; they provide an indestructible production for concrete piers and also are used as dock clusters for mooring.

The advantages offered by steel and concrete dock include greater safety factors, improved appearance, increased resistance to damage from collision, and greater erosion resistance.

Railroad Equipment

Canadian Pacific has placed order with Montreal Locomotive Works for five 4-4-4 type locomotives. These units will be partly streamlined, and are for use in connection with light-weight passenger trains.

National of Mexico is asking for tenders on 10 express and 10 mail and express cars of all-steel construction, 70 ft. long.

Chicago Surface Lines have asked for revised figures on 100 street cars on which bids were rejected some 60 days ago.

RAILS AND TRACK SUPPLIES

Norfolk & Western has awarded 7500 tons of standard steel rails to Carnegie-Illinois Steel Corpn., and 2500 tons to Bethlehem Steel Co.

Wheeling & Lake Erie has ordered 500 tons of rails from Carnegie-Illinois Steel Corpn.

Panama Canal will open bids Nov. 4 for 1721 tons of 90-lb. A. S. C. E. rails and accessories, including 140,000 steel spring nut locks and 30,000 tie plates.

Activites Bearing on Machine Tool Distribution

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A Department Conducted by L. M. Waite

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DELIVERIES

A number of dealers over a considerable area report a consistently steady closing of orders which have been in the pending stage for some 60 to 90 days, and, in several reported cases, for two to three years. Inquiries are reported as very active with the probability that many of them will not reach the order determination stage until after the first of the year when inventories have been taken and annual meetings held.

The records of other post-depression periods reveal that this caution is quite common practice in an absentee management class of shops having an output not quite bordering upon large production. With many of the larger shops still carrying on buying programs, it is very generally considered within the industry that delays in order placing are certain to result in disappointments. One manufacturer reports that each of the company's prospects has been notified to this effect and urged to reach final decision during the month of October. The notification states the dollar volume of business already on hand for January-February delivery as indicating what is termed to be the already existent drive for deliveries.

MODERNIZATION

Among belated comments on the September machine tool show in Cleveland, we find this: "The machine tool industry, in all its departments, has done its part. That its competitive activity is the more remarkable because of the depression order depths to which the industry sank is freely commented. The results accomplished are of extreme importance at this time and in no wise associated with political fanfare. The next real step toward getting out of our bog and morass of poorly conceived expediency lies in the installation of any and all modern equipment that will serve to keep costs down as against a possibly imminent danger of a run-away cost condition, considered by many to be almost unavoidable. Each purchase of modern equipment, whether measured in terms of dollars or thousands of dollars, will add to the permanency of recovered employment."

INTER-INDUSTRY COOPERATION

Several manufacturing decisions to change parts specifications and materials and to redesign in a manner to permit of producing component parts by radically changed methods resulted from demonstrations at the Cleveland machine tool show. At least three large producers took assembly drawings to Cleveland and at different booths asked for suggestions as to how parts might be differently made and assembled in the interest of lowered cost. It is reported that in two of the three cases, suggestions were sufficiently interesting and capable of demonstration with machines on exhibition to warrant hurried design lay-out to check assembly interference. The net re-result is said to have been the placing of some $35,000 in machine tool orders during the past week. The incident illustrates machine tool service in its highest form and the extent to which the wide and varied experience of makers can be utilized as against a normal tendency to continue doing things a certain way for no reason other than because they have always been done that way.

AVAILABLE FUNDS

The annual meeting of the Associated Machine Tool Dealers, held at Cleveland in September, is reported as exceeding the top attendance previously recorded for any meeting of the association. It was generally considered by members that any favorable reaction of small manufacturers to the availability of funds for industrial use under the National Housing Act provisions had been a very small factor in the volume of business placed through dealers during the past few months.

MACHINE TOOL CODE

The passing of the machine tool code, under the Supreme Court decision, is reported from several areas as immediately giving indication of beneficial result through the automatic removal of trade-in condition limitations which were not originally recognized as restrictive of cooperative effort among certain groups but which had just that effect. It is said that the condition would have been very difficult of correction had the life of the code been continued. Associated Dealer Management is cooperating for the retention of code features of a constructive nature.

GERMANY

F. Hurth, Munich, Germany, manufacturer of machine tools and transmissions, sailed for home on the S.S. New York, Oct. 9, enthusiastic over the results of several weeks' stay here during which American machine tools of modern types were under close investigation. Upon leaving, Mr. Hurth expressed optimism as to the possibility of making arrangements whereby it might be possible to place orders for a number of tools upon reaching Munich, such machines to be used in the building of transmissions.

Pipe Lines

Standard Oil Co. of Ohio has awarded about 10,000 tons of 8-in. pipe for a 140-mile oil line from central Michigan to Toledo, Ohio, dividing the tonnage among National Tube Co., Youngstown Sheet & Tube Co. and Republic Steel Corpn.

White Eagle Oil Corpn., Federal Reserve Bank Building, Kansas City, Mo., a subsidiary of Socony-Vacuum Oil Co., New York, has let contract to Smith Construction Co., El Dorado, Kan., for new welded steel pipe line from Burrton Hollow oil district, Reno and Harvey Counties, Kan., to Chase, Kan., about 40 miles, for crude oil. This is first section of proposed 100-mile steel pipe line to be built by company in western Kansas. Cost over $500,000.

United States Engineer Office, P. O. Box 667, Vicksburg, Miss., asks bids until Oct. 28 for 280 ft. of black steel pipe, 17 and 18-in. diameter (Proposal 99).

Panhandle, Tex., plans steel pipe lines for natural gas distribution, including main trunk line, distributing station and operating facilities. Cost about $175,000. Financing is being arranged through Federal aid. J. S. Harrison, Panhandle, is engineer.

Dalton, Ga., plans steel pipe lines for extensions in gas distributing system. Bond issue of $50,000 has been authorized.

Scrap Prices Break At Detroit

DETROIT, Oct. 22. — With a greatly increased amount of scrap coming into the market from automotive plants, prices of a number of items have dropped 25c. to 50c. a ton. Hydraulic compressed sheets, which have been commanding a premium of 75c. over heavy melting steel, are off 50c. Scrap production is heaviest from body and parts factories. The local steel plant is asking dealers to slow up deliveries of material on current contracts.

▲▲▲ Capital Goods Show

THE vigorous upward movement in heavy industrial operations last week, which lifted the capital goods index to 64.4 per cent of the base year average, reflects in part changes of a seasonal nature. Rising automobile production, for example, reached a point last week 53 per cent ahead of where it stood a year ago, indicating graphically the extent by which model changes this season are ahead of earlier years.

Nonetheless, in the full year's reckoning these tendencies will be counted out one against the other. The current trend toward higher levels in industrial fields is not to be gainsaid. While steel production failed to register a weekly gain, and construction enterprises slumped somewhat, on a seasonal basis their respective indices gave added support. Lumber shipments, which have been making history for some time, rose again.

The combined index figure, higher than that for two weeks ago by 6.7 points, is 45 per cent greater than the corresponding figure last year, and one must go back to 1930 to find a better showing for this season.

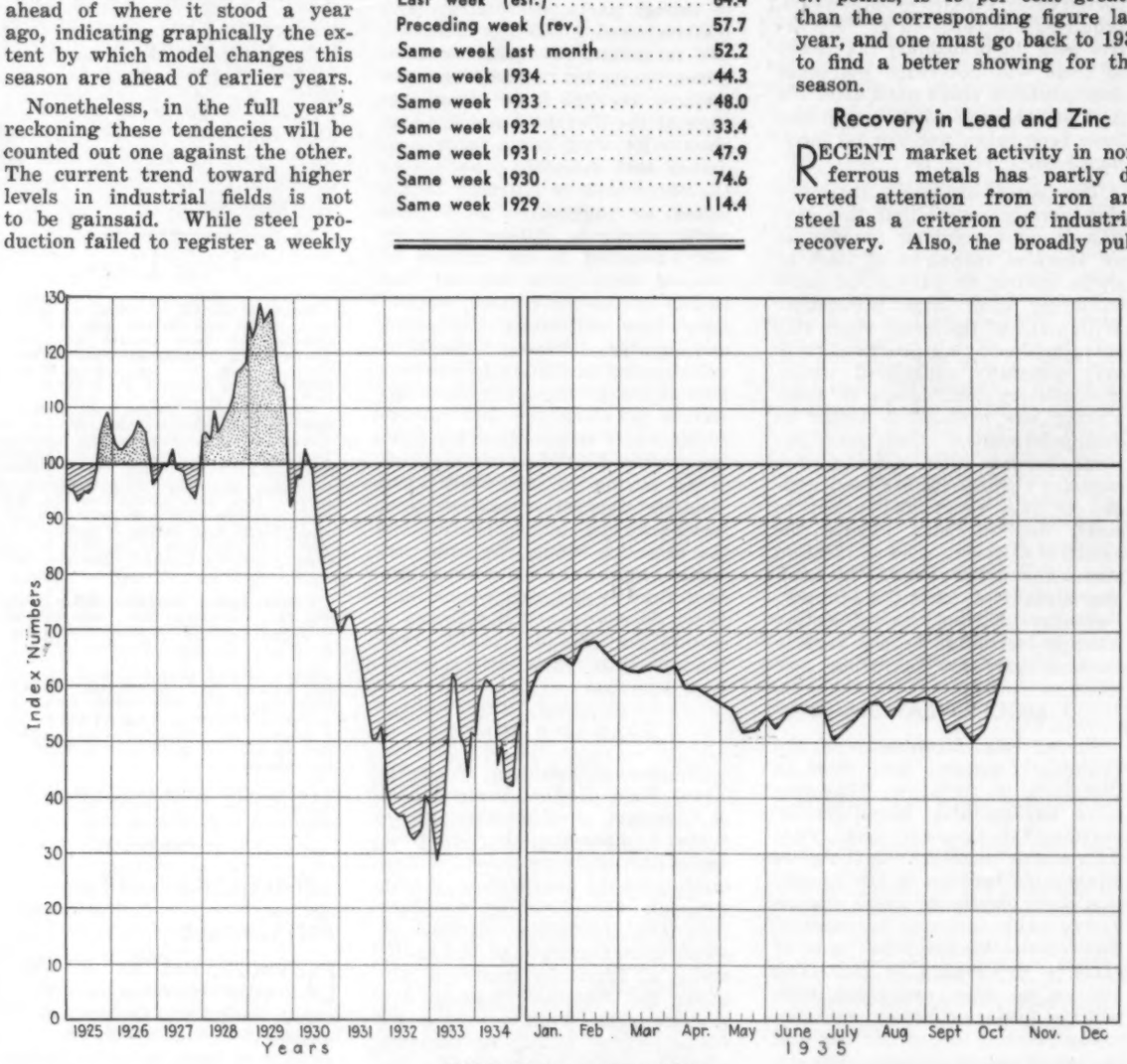
The Iron Age Weekly Index Numbers of Capital Goods Activity

(1925-'27 = 100)

Last week (est.)	64.4
Preceding week (rev.)	57.7
Same week last month	52.2
Same week 1934	44.3
Same week 1933	48.0
Same week 1932	33.4
Same week 1931	47.9
Same week 1930	74.6
Same week 1929	114.4

Recovery in Lead and Zinc

RECENT market activity in nonferrous metals has partly diverted attention from iron and steel as a criterion of industrial recovery. Also, the broadly pub-



(1925-27 Average = 100)

The Iron Age Index of Capital Goods Activity. The years 1925 to 1934 are plotted by months, the current year by weeks.

Components of the index: Steel ingot production rate, from THE IRON AGE; revenue freight carloadings of forest products, from Association of American Railroads; automobile production, from Cram's Automotive Reports; heavy construction contract awards, from *Engineering News Record;* index of productive activity in Pittsburgh district, from Bureau of Business Research of University of Pittsburgh.

Marked Improvement ▲▲▲

licized Italian inquiry for a 60,000-ton block of copper has dovetailed handsomely with newspaper efforts to make war news out of every purchase of steel scrap for export. This latter consideration, however, is of negligible importance compared to the former, and may be dismissed for lack of evidence.

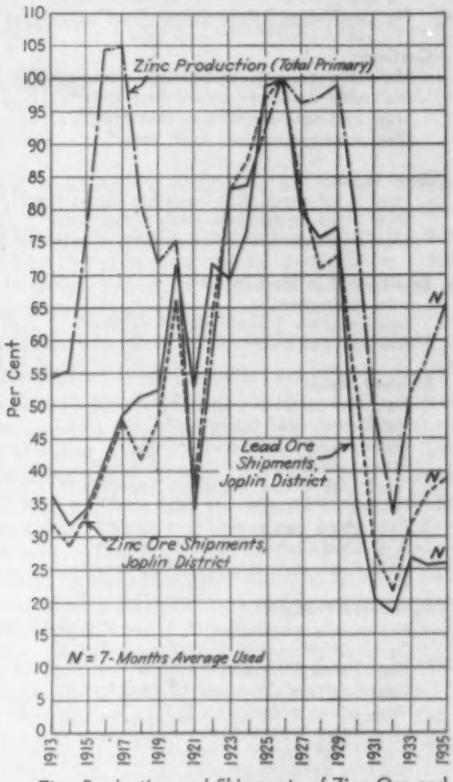
The disposition of lead and spelter to respond to forces operating at large in the heavy industrial field is obvious from the charts at the bottom of the page.

Since no statistics on the production of refined lead prior to 1929 were available, shipments of ore from the important Joplin district were used. This series, in conjunction with total primary zinc production, has been computed on a monthly basis since 1925 by expressing all figures as percentages of the 1926 average. At no time during this period did operations in either field exceed the 1926 rate. Barring the three-year interval through 1929, however, drastic reductions set in.

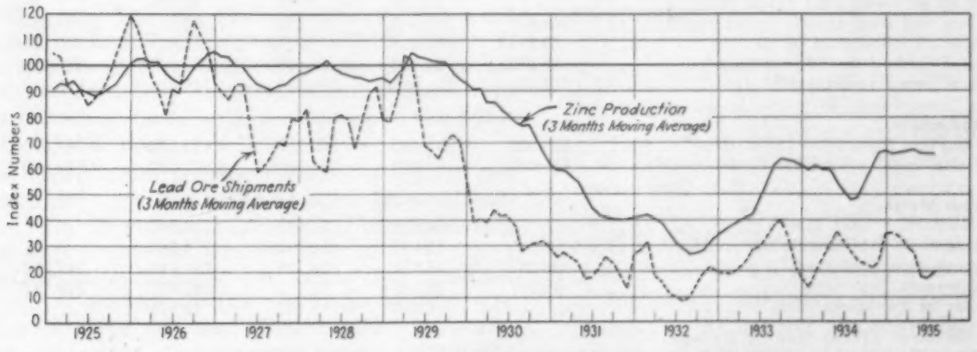
Average monthly lead shipments declined in 1932 to only 18 per cent of the 1926 average, while production of zinc declined to 33 per cent. As a sidelight on the steel industry, it is significant to note that steel ingot production registered a corresponding decrease to 28 per cent of the 1926 average, though to but 24 per cent of the 1929 average. It follows that for at least two of the major non-ferrous metals 1926 was more of a boom year than 1929 on the merits of the present case.

Perhaps an even clearer perception of the present status of these commodities can be gained from the appended chart showing their positions relative to 1926 during the period from 1913 to 1935. In this connection, zinc ore shipments from the Joplin district have been included to enable the reader to make certain comparisons. The shipment series fails materially to measure zinc production prior to 1920, but thereafter is less at fault. During 1915 and 1916, coincident with the war, production reached its highest level, but subsequently commenced to slump until, in 1921, a state of parity with the 1932 depression was reached.

Lead shipments, on the other hand, were much less affected in 1921, and much more depressed in 1932. Just at present, production of zinc at 65.8 per cent of the 1926 average, or 66.5 per cent of the 1929 average, reflects the improved temper of the times. As apparent from the chart, however, the Joplin ore district has not shared proportionately in this recovery.



Zinc Production and Shipments of Zinc Ore and Lead Ore Based on Monthly Averages as Percentages of the 1926 Average.



Zinc Production and Shipments of Lead Ore from the Joplin District.

(1926 = 100)

Current Metal Working Activity Statistically Shown

These Data Are Assembled by The Iron Age from Recognized Sources and Are Changed Regularly as More Recent Figures Are Made Available.

	September, 1935	August, 1935	September, 1934	Nine Months, 1934	Nine Months, 1935
Raw Materials:					
Lake ore consumption (gross tons)[a]	2,654,278	2,615,927	1,236,392	18,003,319	21,809,907
Coke production (net tons)[b]	.....	2,833,707	2,228,400	24,572,700	.....
Pig Iron:					
Pig iron output—monthly (gross tons)[c]	1,776,476	1,761,286	898,000	12,976,000	14,857,025
Pig iron output—daily (gross tons)[c]	59,216	56,816	29,935	39,819	56,523
Castings:					
Malleable castings—production (net tons)[d]	.....	35,245	21,541	282,880	.....
Malleable castings—orders (net tons)[d]	.....	35,602	19,511	270,326	.....
Steel castings—production (net tons)[d]	.....	.....	31,816	371,230	.....
Steel castings—orders (net tons)[d]	.....	.....	20,030	360,933	.....
Steel Ingots:					
Steel ingot production—monthly (gross tons)[e]	2,829,835	2,919,326	1,268,977	20,542,334	24,044,076
Steel ingot production—daily (gross tons)[e]	113,193	108,123	50,759	88,165	103,193
Steel ingot production—per cent of capacity[e]	51.13	48.84	23.05	40.04	46.61
Employment in Steel Industry:					
Total employees[e]	.....	423,925	381,828	402,223	.....
Total payrolls (thousands of dollars)[e]	.....	$47,890	$29,143	$356,819	.....
Average hours worked per week[e]	.....	35.0	24.2	28.2	.....
Finished Steel:					
Trackwork shipments (net tons)[e]	2,962	4,028	3,383	42,620	32,619
Sheet steel sales (net tons)[f]	196,423	207,140	77,063	1,401,288	1,754,861
Sheet steel production (net tons)[f]	190,701	206,613	76,051	1,487,765	1,768,800
Fabricated shape orders (net tons)[g]	.....	86,047	66,586	832,520	.....
Fabricated shape shipments (net tons)[g]	.....	114,906	105,233	792,796	.....
Fabricated plate orders (net tons)[d]	.....	19,305	15,108	182,757	.....
Reinforcing bar awards (net tons)[e]	.....	101,140	7,550	158,280	.....
U. S. Steel Corpn. shipments (tons)[h]	614,933	624,497	370,306	4,797,162	5,341,223
Ohio River steel shipments (net tons)[i]	92,898	92,501	45,848	488,125	671,511
Fabricated Products:					
Automobile production, U. S. and Canada[k]	95,128	247,743	175,586	2,492,695	3,066,456
Construction contracts, 37 Eastern States[l]	.....	$168,557,200	$110,151,200	$1,203,507,200	.....
Steel barrel shipments (number)[d]	.....	600,993	417,114	5,215,953	.....
Steel furniture shipments (dollars)[d]	.....	1,327,252	879,243	8,680,862	.....
Steel boiler orders (sq. ft.)[d]	.....	542,606	539,242	3,367,525	.....
Locomotive orders (number)[m]	7	0	1	89	28
Freight car orders (number)[m]	110	100	4	23,000	7,293
Machine tool index[n]	80.0	125.8	36.2	†37.4	108.5
Foundry equipment index[o]	128.4	113.0	46.4	†46.7	†111.8
Foreign Trade:					
Total iron and steel imports (gross tons)[p]	53,158	31,312	23,847	241,579	299,255
Imports of pig iron (gross tons)[p]	14,357	8,568	12,290	99,091	81,930
Imports of all rolled steel (gross tons)[p]	.....	17,657	8,196	85,986	.....
Total iron and steel exports (gross tons)[p]	244,419	247,312	301,330	2,030,637	2,384,467
Exports of all rolled steel (gross tons)[p]	63,898	82,866	72,165	723,485	610,135
Exports of finished steel (gross tons)[p]	58,893	64,400	69,302	634,833	558,980
Exports of scrap (gross tons)[p]	173,852	156,685	225,212	1,275,414	1,698,441
British Production:					
British pig iron production (gross tons)[r]	529,600	543,400	500,300	4,430,300	4,792,300
British steel ingot production (gross tons)[r]	855,900	759,900	734,700	6,627,200	7,220,300
Non-Ferrous Metals:					
Lead production (net tons)[s]	.....	34,856	31,939	304,845	.....
Lead shipments (net tons)[s]	.....	38,195	36,018	277,547	.....
Zinc production (net tons)[t]	36,088	35,922	26,515	261,448	317,052
Zinc shipments (net tons)[t]	42,217	39,200	21,913	260,438	328,741
Deliveries of tin (gross tons)[v]	.....	5,320	3,850	33,915	.....

*Preliminary. †Three Months' Average.

Source of figures: [a] Lake Superior Iron Ore Association; [b] Bureau of Mines; [c] THE IRON AGE; [d] Bureau of the Census; [e] American Iron and Steel Institute; [f] National Association of Flat-Rolled Steel Manufacturers; [g] American Institute of Steel Construction; [h] United States Steel Corpn.; [i] United States Engineer, Pittsburgh; [k] When preliminary, from Automobile Manufacturers Association—Final figures from Bureau of the Census; [l] F. W. Dodge Corpn.; [m] *Railway Age*; [n] National Machine Tool Builders Association; [o] Foundry Equipment Manufacturers Association; [p] Department of Commerce; [r] British Iron and Steel Federation; [s] American Bureau of Metal Statistics; [t] American Zinc Institute, Inc.; [v] New York Commodities Exchange.

Steel Production Rises One-Half Point to 52½ Per Cent

Gains in Some Districts Exceed Losses in Others—Scrap Index Dips—Rush of Steel Orders from Motor Car Makers Is Still Awaited

STEEL production has risen one-half point to 52½ per cent of capacity, a rate that has been reached twice before since Sept. 1. Operations have been on a plateau for the past seven weeks, at no time dropping more than one point below the present level, and expected advances to a higher plane remain unrealized.

Expansion of automotive demand for steel is much slower than had been looked for and added support from the construction industry is still prospective rather than a present reality.

Mill operating rates are without uniform trend. Steel ingot production has risen four points to 60 per cent in the Valleys, three points to 64 per cent at Cleveland and four points to 85 per cent in the lower Ohio River valley, but it has fallen one-half point to 55 per cent at Chicago, two points to 44 per cent at Buffalo and one point to 39 per cent in the Philadelphia district. Elsewhere operations are substantially unchanged, with Pittsburgh holding at 45 per cent, the Wheeling district at 80 per cent, the South at 54 per cent, and Detroit at 90 per cent.

WITH the industry still marking time, awaiting developments, scrap prices have again wavered. A number of grades have declined at Detroit, and at Pittsburgh heavy melting steel has receded 25c. a ton, depressing THE IRON AGE scrap composite from $12.67 to $12.58 a ton. The index has now fallen twice since it reached its high for the year of $12.83 on Oct. 1. Contrary to the trend of domestic prices, export prices have advanced in New England, where shipments to Italy have been resumed with the loading of two boats flying the Italian flag.

Steel orders from makers of farm equipment and road machinery are beginning to show seasonal curtailment. On the other hand, there has been moderate seasonal improvement in demand from makers of toys and household appliances and from the furniture trade. Stove makers in the St. Louis district are rushed, operating at the highest rate in years. Heavier buying by the machine tool industry, the textile machinery manufacturers and the Southern jobbing trade has improved the position of cold-finished bar makers. A spurt in spot orders for general line can manufacture has halted the seasonal decline in tin plate, sustaining production at 50 per cent of mill capacity.

THE automotive industry, on which further gains in steel output are primarily dependent, has lost none of its optimism, despite the slowness with which it is moving into new model production. Assemblies for October are now estimated at 175,000 units, or about 25,000 less than earlier forecasts, but a sharp gain is said to be assured during November.

Structural steel awards are light, totaling 6825 tons as against 5400 tons in the previous week. New projects, however, are beginning to reflect the progress that is being made in bringing new public projects to the bidding stage, and aggregate 24,300 tons as against 9100 tons a week ago. Plate awards total 3465 tons, reinforcing lettings 6525 tons and piling contracts 1400 tons. Total awards of these forms of construction steel to date this year amount to 1,008,387 tons, as compared with 971,528 tons in the corresponding period in 1934.

The Norfolk & Western has placed 10,000 tons of rails, the Wheeling & Lake Erie has ordered 500 tons, and the Panama Canal Zone has asked for bids on 1721 tons. Sporadic car shortages have encouraged the hope that the railroads will enter the market for rolling stock, but thus far the only effect has been an increase in repairs in the carriers' own shops. The Standard Oil Co. of Ohio has divided an order for 10,000 tons of pipe for a Michigan oil line among three mills.

DEMANDS on the part of steel labor for higher wages, together with the recent rise in fuel costs, have tended to stiffen the attitude of mills on prices. THE IRON AGE composite for finished steel remains unchanged at 2.130c. a lb. Section extras on billet light rails, 50, 55 and 60-lb., have been reduced from $4.37½ to $2 a gross ton. Pig iron shipments in the Great Lakes area are running 20 to 30 per cent ahead of September, and orders supplementing previous purchases for the quarter are being placed in increasing volume. THE IRON AGE pig iron composite is unchanged at $17.84 a ton.

Domestic fluorspar has been advanced $1 to $1.50 a ton to $15.50, mines, for all-rail shipment and to $16.50 for barge delivery. Foreign fluorspar is up $1.50 a ton to $20, duty paid, Atlantic ports.

A Comparison of Prices

Market Prices at Date, and One Week, One Month, and One Year Previous; Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

Per Gross Ton:	Oct. 22, 1935	Oct. 15, 1935	Sept. 24, 1935	Oct. 23, 1934
No. 2 fdy., Philadelphia	$20.3132	$20.3132	$20.3132	$20.26
No. 2, Valley furnace	18.50	18.50	18.50	18.50
No. 2 Southern, Cin'ti	19.2007	19.2007	19.2007	19.13
No. 2, Birmingham†	14.50	14.50	14.50	14.50
No. 2 foundry, Chicago*	18.50	18.50	18.50	18.50
Basic, del'd eastern Pa.	19.8132	19.8132	19.8132	19.76
Basic, Valley furnace	18.00	18.00	18.00	18.00
Malleable, Chicago*	18.50	18.50	18.50	18.50
Malleable, Valley	18.50	18.50	18.50	18.50
L. S. charcoal, Chicago	24.7528	24.7528	24.2528	24.04
Ferromanganese, seab'd carlots	85.00	85.00	85.00	85.00

†This quotation is for delivery in South; in the North prices are 38c. a ton under delivered quotations from nearest Northern furnace.

*The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

Rails, Billets, etc.

Per Gross Ton:				
Rails, heavy, at mill	$36.37½	$36.37½	$36.37½	$36.37½
Light rails, Pittsburgh	35.00	35.00	35.00	35.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	27.00
Sheet bars, Pittsburgh	28.00	28.00	28.00	28.00
Slabs, Pittsburgh	27.00	27.00	27.00	27.00
Forging billets, Pittsburgh	35.00	35.00	35.00	32.00
Wire rods, Pittsburgh	38.00	38.00	38.00	38.00
	Cents	Cents	Cents	Cents
Skelp, grvd. steel, P'gh, lb.	1.70	1.70	1.70	1.70

Finished Steel

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Bars, Pittsburgh	1.85	1.85	1.80	1.80
Bars, Chicago	1.90	1.90	1.85	1.85
Bars, Cleveland	1.90	1.90	1.85	1.85
Bars, New York	2.20	2.20	2.15	2.13
Plates, Pittsburgh	1.80	1.80	1.80	1.80
Plates, Chicago	1.85	1.85	1.85	1.85
Plates, New York	2.09	2.09	2.09	2.08
Structural shapes, Pittsburgh	1.80	1.80	1.80	1.80
Structural shapes, Chicago	1.85	1.85	1.85	1.85
Structural shapes, New York	2.06¼	2.06¼	2.06¼	2.05¼
Cold-finished bars, Pittsburgh	1.95	1.95	1.95	2.10
Hot-rolled strips, Pittsburgh	1.85	1.85	1.85	1.85
Cold-rolled strips, Pittsburgh	2.60	2.60	2.60	2.60

Finished Steel

Per Lb. to Large Buyers:	Oct. 22, 1935 Cents	Oct. 15, 1935 Cents	Sept. 24, 1935 Cents	Oct. 23, 1934 Cents
Hot-rolled annealed sheets, No. 24, Pittsburgh	2.40	2.40	2.40	2.40
Hot-rolled annealed sheets, No. 24, Gary	2.50	2.50	2.50	2.50
Sheets, galv., No. 24, P'gh	3.10	3.10	3.10	3.10
Sheets, galv., No. 24, Gary	3.20	3.20	3.20	3.20
Hot-rolled sheets, No. 10, P'gh	1.85	1.85	1.85	1.85
Hot-rolled sheets, No. 10, Gary	1.95	1.95	1.95	1.95
Wire nails, Pittsburgh	2.40	2.40	2.40	2.60
Wire nails, Chicago dist mill	2.45	2.45	2.45	2.65
Plain wire, Pittsburgh	2.30	2.30	2.30	2.30
Plain wire, Chicago dist. mill	2.35	2.35	2.35	2.35
Barbed wire, galv., P'gh	2.80	2.80	2.80	3.00
Barbed wire, galv., Chicago dist. mill	2.85	2.85	2.85	3.05
Tin plate, 100 lb. box, P'gh.	$5.25	$5.25	$5.25	$5.25

Scrap

Per Gross Ton:				
Heavy melting steel, P'gh	$13.25	$13.50	$13.25	$10.50
Heavy melting steel, Phila.	12.00	12.00	12.50	9.50
Heavy melting steel, Ch'go	12.50	12.50	12.50	8.75
Carwheels, Chicago	12.75	12.75	12.75	9.50
Carwheels, Philadelphia	12.75	12.75	11.75	10.25
No. 1 cast, Pittsburgh	14.25	14.25	14.25	11.25
No. 1 cast, Philadelphia	11.75	11.75	11.75	10.75
No. 1 cast, Ch'go (net ton)	11.25	11.25	11.25	8.00
No. 1 RR. wrot., Phila.	12.25	12.25	12.25	11.25
No. 1 RR. wrot., Ch'go (net)	9.50	9.50	9.50	7.00

Coke, Connellsville

Per Net Ton at Oven:				
Furnace coke, prompt	$3.60	$3.60	$3.25	$3.85
Foundry coke, prompt	4.25	4.25	4.00	4.60

Metals

Per Lb. to Large Buyers:	Cents	Cents	Cents	Cents
Electrolytic copper, refinery	9.00	9.00	8.75	8.75
Lake copper, New York	9.37½	9.37½	9.12½	9.12½
Tin (Straits), New York	51.00	53.00	48.75	51.25
Zinc, East St. Louis	4.85	4.85	4.75	3.85
Zinc, New York	5.22½	5.22½	5.12½	4.20
Lead, St. Louis	4.35	4.35	4.35	3.55
Lead, New York	4.50	4.50	4.50	3.70
Antimony (Asiatic), N. Y.	16.32½	15.75	13.75	9.50

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our detailed price tables.

The Iron Age Composite Prices

	Finished Steel	Pig Iron	Steel Scrap
Oct. 22, 1935	2.130c. a Lb.	$17.84 a Gross Ton	$12.58 a Gross Ton
One week ago	2.130c.	17.84	12.67
One month ago	2.124c.	17.84	12.75
One year ago	2.124c.	17.90	9.58
	Based on steel bars, beams, tank plates, wire, rails, black pipe, sheets and hot-rolled strips. These products make 85 per cent of the United States output.	Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.	Based on No. 1 heavy melting steel quotations at Pittsburgh, Philadelphia and Chicago.

	Finished Steel High	Finished Steel Low	Pig Iron High	Pig Iron Low	Steel Scrap High	Steel Scrap Low
1935	2.130c., Oct. 1	2.124c., Jan. 8	$17.90, Jan. 8	$17.83, May 14	$12.83, Oct. 1	$10.33, April 23
1934	2.199c., April 24	2.008c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	2.015c., Oct. 3	1.867c., April 18	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.977c., Oct. 4	1.926c., Feb. 2	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	2.037c., Jan. 13	1.945c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.273c., Jan. 7	2.018c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.317c., April 2	2.273c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3
1928	2.286c., Dec. 11	2.217c., July 17	18.59, Nov. 27	17.04, July 24	16.50, Dec. 31	13.08, July 2
1927	2.402c., Jan. 4	2.212c., Nov. 1	19.71, Jan. 4	17.54, Nov. 1	15.25, Jan. 11	13.08, Nov. 22

Pittsburgh Operations Unchanged at 45 Per Cent

Valley Rate Rises Four Points to 60 Per Cent, While Wheeling Remains at 80 Per Cent — Scrap Declines

PITTSBURGH, Oct. 22. — Steel ingot production in the Pittsburgh district for the third week remains unchanged at 45 per cent of capacity. Increased flat-rolled steel orders and unusually high tin plate production at Warren, Ohio, have sponsored a four-point advance in the Valleys and nearby northern Ohio mills to 60 per cent. Production in the Wheeling district for the seventh week is holding at around 80 per cent.

The steadiness of raw steel production in practically all steel centers in the Tri-State area provides a rather clear indication that the expected sharp expansion in demand for automobile steel has not yet appeared. In the Pittsburgh area, for example, only a small increase in strip demand attests a growing movement of automobile steel. The fact that such demand has expanded so slowly is sustaining hopes that November will usher in a more substantial buying movement for automobile requirements. Whether demand from miscellaneous sources, the railroads and constructional fields will follow the same course, even on a small scale, is conjectural.

Some seasonal increases in miscellaneous steel needs are appearing and may help rolling schedules later this quarter. But demand from the railroads continues to be discouragingly limited, and no extensive buying is yet in sight. Recent rail orders reaching this district will provide partial engagement of the local rail mill for the next two weeks. Cold-finished bar business has increased without notable support from the automotive industry.

Finishing mill schedules are practically unchanged, with sheet production slightly lower at 65 to 70 per cent, and strip steel and tin plate at around 50 per cent. Pipe production in the Pittsburgh district is sustained at 40 to 45 per cent.

Prices appear to be steady in the face of growing demand on the part of steel labor for higher wages, and increased fuel costs, which will spread when consumers have liquidated heavy lower-priced stocks purchased during the summer.

The Pittsburgh scrap market has softened slightly, with No. 1 heavy melting steel off 25c. a ton.

Pig Iron

Small-lot spot orders continue to make up the bulk of transactions in this market. Occasionally a small independent steel mill enters the market for its early requirements of basic, which amounts usually to two barge loads a month. It is considered unlikely that a measurable part of the 15,000-ton requirements of castings and forgings for the housing for the Carnegie-Illinois Steel Corpn.'s continuous plate mill at Homestead, Pa., will be reflected in demand for pig iron in the open market. This business undoubtedly will be ruled by reciprocal agreements.

Semi-Finished Steel

The total movement of semi-finished steel is holding its recent pace. Slightly heavier demand for slabs and forging stock reflects increased assembly plans of the automotive industry. Sheet bar tonnage, however, has fallen as a result of diminished demand from detached tin mills. Interest in wire rods is narrowing. Consumers appear to be most widely stocked with forging billets, which were bought quite heavily in anticipation of the price advance last month.

Bolts, Nuts and Rivets

Releases on fourth quarter contracts have shown little improvement except from the automotive industry. Important railroad equipment contracts are few and shipments for such construction are barely holding their own. Takings by the jobbers are in small volume. Price unsettlement has not entirely been averted by the revised discount effected Oct. 1, although large producers appear to be adhering closely to published discounts.

Rails and Track Accessories

The Norfolk & Western Railroad awarded 7500 tons of steel rails to Carnegie-Illinois Steel Corpn. and 2500 tons to Bethlehem Steel Co. A substantial quantity of tie plates and track spikes was distributed among five producers. The Carnegie-Illinois company also has received an order for 500 tons of rails from the Wheeling & Lake Erie and a small tonnage of light rails for export to Brazil. The company will supply its own requirements of about 8000 ft. of gage tracks for its own semi-continuous plate mill project at Homestead, Pa. The local rail mill will roll about 11,000 tons of rails during the next two weeks, including substantial releases against the recent Chesapeake & Ohio order. The former extra of $4.37½ a gross ton for light rails rolled from new billets, over 45 to 60 lb. inclusive has been reduced to $2.

Cold-Finished Bars

A small pick-up in orders since mid-October is helping some producers to maintain comfortable backlogs acquired late in September. The improvement emanates from the machine tool industry, the textile machinery manufacturers and, less notably, from increased jobbing demand in certain Southern sections. The increase in automotive business is not considered significant, but this class of business is believed to be pointed toward gradual expansion during the next several weeks. Cold finishing plant schedules are holding at around 60 per cent. Practically all September tonnage booked for shipment at mill convenience in October will be shipped by the close of the month.

Reinforcing Steel

Producers are depending a good deal on backlogs, which are not being fattened noticeably by recent lettings of public work projects. Contract lettings for road construction have increased, and there will be a drive to complete jobs in some sections before cold weather interrupts. The large-scale railroad grade crossing elimination projection has not advanced to a point where material requirements are being discussed.

Plates and Shapes

The American Barge Line Co., Pittsburgh, has awarded 2565 tons of plates to McClintic-Marshall Corpn. for eight barges and tanks. Shipments of plates to nearby railroad car plants are only moderate. Tank and boiler work is spotty.

The list of awards reported here for the past week was one of the smallest in many weeks, and was restricted entirely to public works projects. Fresh inquiries were slightly heavier, featured by 2000 tons for New York Central de-

pressed track work at New York. A Navy structural and pipe shop at Charleston, S. C., will require 1000 tons.

Tubular Products

General demand for tubular goods is holding steadily, with the movement of oil country goods still leading. Sporadic increases in railroad buying of locomotive boiler tubes are reported. No change is perceptible in this district in pipe output, which is holding at 40 to 45 per cent. Prices are being well maintained.

Bars

Further scattered increases in orders from forging shops and automotive parts makers are reported, but total volume of incoming business from these sources is not yet considered a significant reflection of the expected expansion in requirements for new model production. Alloy bars are beginning to feel the impulse of increased automobile production. Miscellaneous demand is wavering slightly, with agricultural implement demand a steadying influence. New orders are not so large as specifications against tonnage booked in September, when unusually heavy bookings were made by non-integrated cold finishing plants.

Wire Products

The wire business generally reflects the even pace of most other steel lines. There is a slight seasonal tendency toward increased demand from the furniture trade, manufacturers of household appliances and toys. Improvement in demand for manufacturers' wire from motor car centers still is small. The jobbing trade remains relatively dull.

Sheets

Automobile tonnage and miscellaneous orders divided honors in the past week. Specifications are running ahead of bookings, and heavy shipments in recent weeks have pared producers' backlogs. Production for the sheet industry is slightly lower at 65 to 70 per cent of capacity, but faces expansion within the next fortnight, when at least one heavy purchase of automobile sheets is in prospect. Galvanized sheet production is showing remarkable staying powers at about 75 per cent. All mill prices are well maintained, the only soft spot being for galvanized roofing.

Tin Plate

Spurts in spot orders for "general line" can manufacture are sustaining production in the tin plate industry at about 50 per cent of capacity. With the unusually heavy stocks in mill hands, however, backlogs are growing thinner and dependence upon spot requirements is increasing. Some producers operating at better than 50 per cent face the likelihood of sharp reductions in the next fortnight.

Strip Steel

Automobile requirements are accounting for a moderate expansion in total incoming volume, but the increase has not been sufficient in the past week to extend production beyond the recent 50 per cent rate. Demand for cold-rolled strip is running ahead of that for hot-rolled material. The Ford Motor Co. soon is expected to release substantial orders for radiator grilles, which in turn should benefit strip producers. Miscellaneous business is holding its own, with orders representing well diversified groups. Prices appear to be resisting any weak tendencies.

Coal and Coke

Unusually warm weather has retarded demand for domestic coal and coke. Industrial users evidently are marking time, pending clarification of the price situation and the application of the Guffey act. Although some producers already have advanced prices at least 15c. a ton to compensate for increased mine wages, opinion is growing that prices established under the defunct coal code will rule under the Guffey act. Until the Guffey act becomes operative and prices are definitely established, little important industrial demand is expected to materialize. A spurt in shipments for Lake movement which will largely be concluded on Nov. 15, probably will appear before the close of October.

Scrap

No. 1 heavy melting steel has softened on a representative sale to an independent mill at $13.50, delivered. Another small steel plant is picking up odd lots of that grade at $13.25. The weakness in this district is regarded as temporary and a reflection of dullness in nearby districts. Shipping suspensions at some points also are depressing influences. Recent steel orders are fairly well covered and brokers now are able to cover more readily at $13 and $13.25. An independent steel maker has purchased about 10,000 tons of heavy breakable cast at $12.75, delivered, the same price that ruled on the last sizable transaction. Scrap rails are 25c. a ton lower on recent sales. All other grades are dull and unchanged.

Weekly Indications of Steel Activity

From The Iron Age

	Oct. 22, 1935	Oct. 15, 1935	Sept. 24, 1935	Oct. 23, 1934	Average Year to Date 1935	1934
Steel ingot operations—Per cent of capacity	52.5	52.0	51.5	24.5	46.8	38.6

	Week Ended Oct. 22, 1935	Oct. 15, 1935	Sept. 24, 1935	Oct. 23, 1934	Year to Date 1935	1934
Fabricated structural steel awards	6,825	5,400	19,900	22,100	572,655	652,830
Fabricated plate awards	3,465	1,650	3,860	500	117,602	103,842
Sheet steel piling awards	1,400	0	125	0	52,690	47,350
Reinforcing bar awards	6,525	3,415	12,965	2,600	265,440	167,506

Output Dips to 55 Per Cent at Chicago

Automotive Releases Show Gradual Improvement, But Construction Volume Is Below Expectations—Scrap Is Firm

CHICAGO, Oct. 22.—Ingot output has not had the staying qualities indicated a week ago and the rate is off one-half point to 55 per cent of capacity.

Releases from automobile centers are moderately higher and manufacturing activity, with the exception of machine tools, is holding in this area, but structural material and reinforcing bar specifications have fallen sufficiently to offset gains in other directions. There is some further encouragement from the railroad field, where pressure for certain types of cars is unabated and railroads are being forced to expend more for repairs and to use correspondingly larger quantities of steel mill products. Scanty structural business should at this time be bolstered by overhead crossing programs, but all governments concerned are moving very slowly and the starting time of this work remains in the guessing stage.

The scrap market is giving little indication of the drift of things beyond the surprising strength of current quotations, which seem even more solidly entrenched than a week ago.

A review of the whole situation cannot be made without the observation that steel mill operations may already have reached the high for the last half of the year.

Pig Iron

Secondary purchases and spot orders are still in good volume and shipments are moving at a rate which indicates that October will top September by at least 20 per cent. Furnace stocks are a bit ragged and it is quite likely that another merchant stack will be lighted in the very near future. The price situation is one that has all users guessing, not as to whether there will be an advance but as to when it will come. Many feel that it is very close at hand. Charcoal iron furnaces are sold well in advance and shipments are equal to the make.

Reinforcing Bars

The Milwaukee filter plant, taking 1800 tons, the Benton Harbor, Mich., bridge requiring 350 tons, and several other awards give this market an appearance of activity that is not supported either by inquiries, which are small and scattered, or by shop operations, which are pointed downward. There is again a possibility that the Chicago housing projects will be started, it being reported that the sites are to be cleared in the near future. There are no accurate estimates of the bar tonnage to be used, but sellers believe needs will range from 500 to 1000 tons.

Cast Iron Pipe

Milwaukee holds the spotlight. It has announced low bidder on 500 tons of 12-in. pipe, and plans are at the point where it will be possible to take bids about Nov. 1 on a large tonnage of pipe and fittings for a filter plant addition. In all other respects the market is quiet, though there is a fair smattering of small tonnages being placed from week to week. The Sanitary District, Chicago, is accepting shipments against old contracts and has plans on drawing boards that will take additional tonnages.

Rails

Mystery still exists as to what railroads will buy in the fall and the early winter. Sellers are of the impression that some of the carriers have done some preliminary figuring, but there is no hint as to what any of the tonnages will be. One of the railroads that is probably closest to an announcement is the Santa Fe, which has already announced a track improvement program and which has recently made a 40-hr. run from the Pacific Coast to Chicago with a Diesel locomotive and standard coach equipment. That run is looked upon as somewhat of a test of roadbed conditions. The light rail market is quiet, but this is about the time of year when larger tonnages can usually be expected.

Plates

Notwithstanding that recent weeks have witnessed inquiries for pipe lines and refinery equipment, the plate market remains very quiet and mills are getting only scattered tonnages and most of them come from structural fabricators. An encouraging condition is that railroads, still pressed for certain types of cars, are enlarging repair programs and as a consequence are taking more steel. One Northwestern railroad that had in mind wrecking a large group of cars, has called off that plan and now intends to put those cars through repair shops.

Sheets

Output holds near 80 per cent of capacity, but there are indications that demand may ease in the near future. Jobbers are taking fair quantities and there is an upturn in demand for galvanized sheets to be used in country areas. Container manufacturers have lost some ground, but makers of metal shelving and office furniture are holding the rate of output reached earlier in the fall.

Wire

Consumers are pressing for more wire products and output nas climbed well above the 60 per cent mark, where it promises to remain for the time being. On the whole, stocks are once again growing heavier, though the pace is slow. Mill stocks of nails are shrinking as residential building grows, but stocks of fencing are growing. Jobbers are showing more interest and demand for manufacturers' wire is now such that deliveries range from a week to ten days. The slow items are reinforcing mesh and some types of electrical wires and cables. On the whole, the market is on a parity with 1930.

Cold-Rolled Strip

Deliveries now average about three weeks and operations are near capacity, not necessarily in tonnage, but as gaged by what mills can do on the basis of the character of current orders, which are made up largely of the "fussy" sizes.

Bars

Automobile centers are drawing more heavily from local mills, but there is not yet the pressure from that direction which many had expected in the last half of October. Orders in the past week were the best in two months. The agricultural implement group is still holding to a high rate of output and the future looks bright. Forgers in the Chicago area are enjoying a substantial volume of business.

Structural Material

New awards at 2000 tons and fresh inquiries for 4000 tons make

a very poor showing. The mere fact of low tonnages would not be so disturbing to fabricators were it not that this situation has now prevailed for three weeks or more and there does not seem to be a break in sight. There are times when the overhead crossing program seems to be a step nearer, but it certainly is disconcerting to all concerned to watch this major development drag as has been the case for several months. Mills are beginning to feel the pinch of dwindling specifications.

Scrap

This market remains quiet, with prices firmly established. Brokers continue to pay dealers from $12.75 to $12.85 a ton for heavy melting steel. There is less congestion on mill tracks, which is due to consumers' success in stopping the excess flow rather than to a shortening of supplies. The Santa Fe is offering 5000 tons, including 2000 tons of heavy melting steel. The Burlington has sent out a 4000-ton list. Scrap continues to move by boat from Chicago docks.

Fabricated Structural Steel

Awards Slightly Higher—New Projects in Good Volume

LETTINGS of 6825 tons, which compare with 5400 tons last week, are all in small lots with the exception of 1410 tons for a dam in the Mississippi River at Winfield, Mo. New projects of 24,300 tons compare with 9100 tons in the previous week and 47,365 tons two weeks ago. New jobs are mostly for public work and include 4925 tons for a highway bridge over the Missouri River at Weldon Springs, Mo., 4000 tons for a science building for Brooklyn College in Brooklyn, 3443 tons, including 1500 tons reported last week, for the Port of New York Authority for the Midtown tunnel, and 2600 tons for track depression work in New York for the New York Central Railroad. Plate awards total 3465 tons. Lettings of sheet piling call for 1400 tons. Structural steel awards for the week follow:

NORTH ATLANTIC STATES

Providence, R. I., 195 tons, incinerator, to New England Structural Co.

New York, 270 tons, post office station "W", to Bethlehem Fabricators, Inc.

New York, 380 tons, post office station "O", to Bethlehem Fabricators, Inc.

New York, 180 tons, repairs to Williamsburg bridge, to McClintic-Marshall Corpn.

Steuben County, N. Y., 285 tons, State highway bridge, to Lackawanna Steel Construction Corpn.

Kirkland, N. Y., 125 tons, State highway bridge, to McClintic-Marshall Corpn.

SOUTH AND SOUTHWEST

Columbia County, Ark., 120 tons, bridge, to Arkansas Foundry Co.

Hays County, Tex., 210 tons, bridge, to Alamo Iron Works.

Jackson County, Tex., 100 tons, bridge, to Alamo Iron Works.

Hacienda, Tex., 680 tons, bridge spans for Southern Pacific Railroad, to Virginia Bridge & Iron Co.

State of Oklahoma, 300 tons, bridges, to Capitol Steel & Iron Co.

CENTRAL STATES

Detroit, 175 tons, studio building, to Whitehead & Kales Co.

Lansing, Mich., 295 tons, State highway bridge, to R. C. Mahon Co.

Lowellville, Ohio, 180 tons, addition to mill building for Sharon Steel Hoop Co., to Pittsburgh Bridge & Iron Co.

Clark County, Mo., 365 tons, bridge, to Illinois Steel Bridge Co.

Milwaukee Road, 122 tons, three girder spans, to Milwaukee Bridge Co.

Winfield, Mo., 1470 tons, lock for Mississippi River dam No. 25, to Mississippi Valley Structural Steel Co.

St. Louis, 150 tons, floral conservatory in Forest Park, to LaSalle Iron Works, St. Louis.

Arapahoe, Neb., 160 tons, State highway bridge, to Omaha Steel Works.

WESTERN STATES

Salt Lake County, Utah, 100 tons, State bridge, to an unnamed bidder.

Bonneville Dam, Ore., 400 tons, power house superstructure and fishways, to Wallace Bridge & Structural Steel Co.

Hollywood, Cal., 160 tons, sound stage for United Artists Corpn., to Consolidated Steel Corpn.

Los Angeles, 100 tons, factory for Gladding-McBean Co., to Consolidated Steel Corpn.

Los Angeles, 100 tons, tunnel rigs for Metropolitan Water District, Specifications No. 45618, to Youngstown Steel Car Corpn.

Los Angeles, 100 tons, movable tunnel forms, Specification No. 127, to an unnamed bidder.

Whittier, Cal., 100 tons, post office, to an unnamed bidder.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Newburyport, Mass., 200 tons, school.

Eastport, Me., 600 tons, dam.

Providence, R. I., 300 tons, Reservoir Avenue bridge.

State of New York, 275 tons, highway bridges.

New York, 400 tons, Third Avenue subway for New York Central Railroad.

New York, 5400 tons, Manhattan approach to Triborough bridge; Corbetta Construction Co., New York, low bidder on general contract.

New York, 2600 tons, track depression for New York Central; bids to be taken Oct. 29.

New York, 4600 tons, West Side elevated highway, Seventy-sixth to Seventy-ninth Streets; bids to be taken by New York Transit Commission Oct. 29.

New York, 3443 tons, including 1500 tons of fabricated steel, 223 tons of roadway beams and 1720 tons of structural steel liner plates as alternate for cast iron, for New Jersey land portion of Midtown tunnel under Hudson River; bids to be taken Nov. 7 by Port of New York Authority.

New York, 870 tons, public school 105 in Bronx; bids taken Oct. 21.

Brooklyn, 3750 tons, Franklin Lane High School; general contract let to Wilaka Construction Co., Brooklyn.

Brooklyn, 4000 tons, science building for Brooklyn College; general contract let to T. J. Waters Co., New York.

Wyoming County, Pa., 250 tons, bridge; Holmes Construction Co. low bidder.

Philadelphia, 300 tons, reconstruction of Chesapeake & Delaware canal by United States Engineers.

Beaver County, Pa., 230 tons, highway bridge; tenders Nov. 1.

Crawford County, Pa., 440 tons, highway bridge; tenders Nov. 1.

Edgemoor, Pa., 650 tons, four warehouses for Ludlow Mfg. Co.; bids in.

SOUTH AND SOUTHWEST

Williamsburg, Ky., 300 tons, bridge.

Charleston, S. C., 1000 tons, Navy Yard structural and pipe shop.

Waco, Tex., 185 tons, post office.

Wagoner, Okla., 700 tons, bridge.

CENTRAL STATES

Hand, Mich., 425 tons, bridge.

Cleveland, 300 tons, buildings for easterly sewage disposal plant. Lundoff-Bicknell Co. low bidder.

Dayton, Ohio, 600 tons, Loose-Wiles Biscuit Co. building.

Milwaukee, 200 tons, Parklawn housing project.

Lyons, Wis., 250 tons, bridge; bids Oct. 29.

State of Wisconsin, 250 tons, bridges.

State of Missouri, 300 tons, bridges.

St. Louis, 325 tons, building in Forest Park.

Weldon Springs, Mo., 4925 tons, highway bridge over Missouri River; bids Nov. 8.

WESTERN STATES

State of Nevada, 175 tons, bridges in Eureka and Lyon counties; bids Oct. 30.

Monterey County, Cal., 337 tons, State undercrossing at Salinas; bids Nov. 6.

Alameda County, Cal., 483 tons, State overhead crossing at Albany; bids Nov. 6.

Los Angeles, 640 tons, intake and Gene pumping plant for Metropolitan Water District; bids Nov. 19.

Panama Canal Zone, 395 tons, material under Specification No. 3097; bids Oct. 28.

FABRICATED PLATES

AWARDS

Pittsburgh, 2565 tons, barges and tanks for American Barge Line Co., to McClintic-Marshall Corpn.

Boulder City, Nev., 900 tons, five siphons on South Boulder diversion conduit, to Thompson Mfg. Co.

NEW PROJECTS

Los Angeles, 1860 tons, intake and Gene pumping plant, Specification No. 133; bids Nov. 19.

SHEET PILING

AWARDS

Morehead City, N. C., 1400 tons, ocean terminal project, Port Commission; contract approved by PWA Authorities for award to T. A. Loving, Goldsboro, N. C., for furnishing German material.

NEW PROJECTS

Neville Island, Pa., 1000 tons, alteration to Emsworth dam; bids, United States Engineer Office, Oct. 25.

Spokane, Wash., 400 tons, Upriver station control works and power house; bids Dec. 5.

Prices of Finished Steel and Iron Products

BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel	*Base per Lb.*
F.o.b. Pittsburgh	1.85c.
F.o.b. Chicago	1.90c.
F.o.b. Gary	1.90c.
F.o.b. Duluth	2.00c.
Del'd Detroit	2.00c.
F.o.b. Cleveland	1.90c.
F.o.b. Buffalo	1.95c.
Del'd Philadelphia	2.16c.
Del'd New York	2.20c.
F.o.b. Birmingham	2.00c.
F.o.b. cars dock Gulf ports	2.25c.
F.o.b. cars Pacific ports	2.40c.

Rail Steel (For merchant trade)	
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Gary	1.75c.
F.o.b. Moline, Ill.	1.75c.
F.o.b. Cleveland	1.75c.
F.o.b. Buffalo	1.80c.
F.o.b. Birmingham	1.85c.
F.o.b. cars dock Gulf ports	2.10c.
F.o.b. cars dock Pacific ports	2.25.

Billet Steel Reinforcing (Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	2.05c.
F.o.b. Chicago	2.10c.
F.o.b. Gary	2.10c.
Del'd Detroit	2.20c.
F.o.b. Cleveland	2.10c.
F.o.b. Youngstown	2.10c.
F.o.b. Buffalo	2.10c.
F.o.b. Birmingham	2.10c.
F.o.b. cars dock Gulf ports	2.45c.
F.o.b. cars dock Pacific ports	2.45c.

Rail Steel Reinforcing (Straight lengths as quoted by distributors)	
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago	1.95c.
F.o.b. Gary	1.95c.
F.o.b. Cleveland	1.95c.
F.o.b. Youngstown	1.95c.
F.o.b. Buffalo	1.95c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.30c.
F.o.b. cars dock Pacific ports	2.30c.

Iron	
F.o.b. Chicago	1.80c.
F.o.b. Terre Haute, Ind.	1.75c.
F.o.b. Louisville, Ky.	2.10c.
F.o.b. Danville, Pa.	1.80c.
F.o.b. Berwick, Pa.	1.70c.

Cold Finished Bars and Shafting*

	Base per Lb.
F.o.b. Pittsburgh	1.95c.
F.o.b. Chicago	2.00c.
F.o.b. Gary	2.00c.
F.o.b. Cleveland	2.00c.
F.o.b. Buffalo	2.05c.
Del'd Detroit	2.15c.
Del'd eastern Michigan	2.20c.

* In quantities of 10,000 to 19,000 lb.

Fence and Sign Posts

Angle Line Posts	*Base per Net Ton*
F.o.b. Pittsburgh	$50.00
F.o.b. Chicago	50.00
F.o.b. Duluth	51.00
F.o.b. Cleveland	50.00
F.o.b. Birmingham	53.00
F.o.b. Houston, Orange, Beaumont, Galveston	59.00
F.o.b. Mobile	58.00
F.o.b. New Orleans, Lake Charles, Corpus Christi	59.00
F.o.b. cars dock Pacific ports	63.00

Plates

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
F.o.b. Gary	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Coatesville	1.90c.
F.o.b. Sparrows Point	1.90c.
Del'd Philadelphia	1.99c.
Del'd New York	2.09c.
F.o.b. Birmingham	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.
Wrought iron plates, f.o.b. P'gh	3.20c.

Floor Plates

F.o.b. Pittsburgh	3.35c.
F.o.b. Chicago	3.40c.
F.o.b. Coatesville	3.45c.
F.o.b. cars dock Gulf ports	3.75c.
F.o.b. cars dock Pacific ports	3.90c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh	1.80c.
F.o.b. Chicago	1.85c.
Del'd Cleveland	1.995c.
F.o.b. Buffalo	1.90c.
F.o.b. Bethlehem	1.90c.
Del'd Philadelphia	2.015c.
Del'd New York	2.0625c.
F.o.b. Birmingham (standard)	1.95c.
F.o.b. cars dock Gulf ports	2.20c.
F.o.b. cars dock Pacific ports	2.35c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	2.15c.
F.o.b. Chicago	2.25c.
F.o.b. Buffalo	2.25c.
F.o.b. cars dock Gulf ports	2.60c.
F.o.b. cars dock Pacific ports	2.60c.

SHEETS, STRIP, TIN PLATE TERNE PLATE

Sheets

Hot Rolled	*Base per Lb.*
No. 10, f.o.b. Pittsburgh	1.85c.
No. 10, f.o.b. Gary	1.95c.
No. 10, del'd Detroit	2.05c.
No. 10, del'd Phila.	2.16c.
No. 10, f.o.b. Birmingham	2.00c.
No. 10, f.o.b. cars dock Pacific ports	2.40c.

Hot-Rolled Annealed	
No. 24, f.o.b. Pittsburgh	2.40c.
No. 24, f.o.b. Gary	2.50c.
No. 24, del'd Detroit	2.60c.
No. 24, del'd Phila.	2.71c.
No. 24, f.o.b. Birmingham	2.55c.
No. 24, f.o.b. cars dock Pacific ports	3.05c.
No. 24, wrought iron, Pittsburgh	4.30c.

Heavy Cold-Rolled	
No. 10 gage, f.o.b. Pittsburgh	2.50c.
No. 10 gage, f.o.b. Gary	2.60c.
No. 10 gage, del'd Detroit	2.70c.
No. 10, gage, del'd Phila.	2.81c.
No. 10 gage, f.o.b. Birmingham	2.65c.
No. 10 gage, f.o.b. cars dock Pacific ports	3.10c.

Light Cold-Rolled	
No. 20 gage, f.o.b. Pittsburgh	2.95c.
No. 20 gage, f.o.b. Gary	3.05c.
No. 20 gage, del'd Detroit	3.15c.
No. 20 gage, del'd Phila	3.26c.
No. 20 gage, f.o.b. Birmingham	3.10c.
No. 20 f.o.b. cars dock Pacific ports	3.50c.

Galvanized Sheets	
No. 24 gage, f.o.b. Pittsburgh	3.10c.
No. 24, f.o.b. Gary	3.20c.
No. 24, del'd Phila.	3.41c.
No. 24, f.o.b. Birmingham	3.25c.
No. 24, f.o.b. cars dock Pacific ports	3.70c.
No. 24, wrought iron, Pittsburgh	4.95c.

Long Ternes	
No. 24, unassorted 8-lb. coating f.o.b. Pittsburgh	3.40c.
F.o.b. Gary	3.50c.
F.o.b. cars dock Pacific ports	4.10c.

Vitreous Enameling Stock	
No. 20, f.o.b. Pittsburgh	3.10c.
No. 20, f.o.b. Gary	3.20c.
No. 20, f.o.b. Birmingham	3.70c.
No. 20, f.o.b. cars dock Pacific ports	3.70c.
No. 10, f.o.b. Pittsburgh	2.50c.
No. 10, f.o.b. Gary	2.60c.
No. 10, f.o.b. Birmingham	3.10c.
No. 10, f.o.b. cars dock Pacific ports	3.10c.

Tin Mill Black Plate	
No. 28, f.o.b. Pittsburgh	2.75c.
No. 28, Gary	2.85c.
No. 28, cars dock Pacific Coast ports	3.35c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mill	$5.25
Standard cokes, f.o.b. Gary	5.35
Standard cokes, f.o.b. cars dock Pacific ports	5.90

Terne Plate

(F.o.b. Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C.	$10.00
15-lb. coating I.C.	12.00
20-lb. coating I.C.	13.00
25-lb. coating I.C.	14.00
30-lb. coating I.C.	15.25
40-lb. coating I.C.	17.50

Hot-Rolled Hoops, Bands, Strips and Flats under ¼ In.

	Base per Lb.
All widths up to 24 in., P'gh	1.85c.
All widths up to 24 in., Chicago	1.95c.
All widths up to 24 in., del'd Detroit	2.05c.
All widths up to 24 in., Birmingham	2.00c.
Cooperage stock, Pittsburgh	1.95c.
Cooperage stock, Chicago	2.05c.

Cold-Rolled Strips

	Base per Lb.
F.o.b. Pittsburgh	2.40c.
F.o.b. Cleveland	2.60c.
Del'd Chicago	2.895c.
F.o.b. Worcester	2.80c.

Fender Stock	
No. 14, Pittsburgh or Cleveland	2.90c.
No. 14, Worcester	3.30c.
No. 20, Pittsburgh or Cleveland	3.30c.
No. 20, Worcester	3.70c.

Hot-Rolled Rail Steel Strips

	Base per Lb.
F.o.b. Pittsburgh	1.70c.
F.o.b. Chicago	1.75c.
F.o.b. Birmingham	1.85c.

WIRE PRODUCTS

(Carload lots, f.o.b. Pittsburgh and Cleveland.)

To Manufacturing Trade	*Per Lb.*
Bright wire	2.30c.
Spring wire	2.90c.

Chicago prices on products sold to the manufacturing trade are $1 a ton above Pittsburgh or Cleveland. Worcester and Duluth prices are $2 a ton above, Birmingham $3 above, and Pacific Coast prices $9 a ton above Pittsburgh or Cleveland.

To Larger Lot Buyers	*Base per keg*
Standard wire nails	$2.40
Smooth coated nails	2.40

Base per 100 Lb.	
Annealed fence wire	$2.45
Galvanized fence wire	2.80
Polished staples	3.10
Galvanized staples	3.35
Barbed Wire, galvanized	2.80
Twisted barbless wire	2.80
Woven wire fence, base column	58.00
Single loop bale ties, base column	53.00

Chicago and Anderson, Ind., mill prices are $1 a ton over Pittsburgh base (on all products except woven wire fence, for which the Chicago price is $2 above Pittsburgh); Duluth, Minn., and Worcester, Mass., mill prices are $2 a ton over Pittsburgh (except for woven wire fence at Duluth, which is $3 over Pittsburgh), and Birmingham mill prices are $3 a ton over Pittsburgh.

On wire nails, barbed wire, staples and fence wire, prices at Houston, Galveston and Corpus Christi, Tex., New Orleans, Lake Charles, La., and Mobile, Ala., are $6 a ton over Pittsburgh, while Pacific Coast prices are $8 over Pittsburgh. Exception: on fence wire Pacific Coast prices are $11 a ton above Pittsburgh.

On staples and barbed wire, prices of $6 a ton above Pittsburgh are also quoted at Beaumont and Orange, Tex.

Wire Hoops, Twisted or Welded

Of List	
F.o.b. Pittsburgh	35 and 2½ off
F.o.b. Chicago	35 off

STEEL AND WROUGHT PIPE AND TUBING

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio Mills

F.o.b. Pittsburgh only on wrought iron pipe.

Butt Weld

Steel Inches	Black	Galv.
⅛	51½	29½
¼ to ⅜	53½	35
½	56½	47
¾	62	52
1 to 3	64	55

Wrought Iron Inches	Black	Galv.
⅛	+91½	+138
¼ & ⅜	+1½	+21½
½	31½	15
¾	36½	20½
1 & 1¼	39½	25½
1½	43½	28
2	41½	26

Lap Weld

2	60	51	2	37	32½
2½ to 3	63	54	2½ to 3½	38	25
3½ to 6	65	56	4 to 8	40	28½
7 and 8	64	54	9 to 12	38	24½
9 and 10	63½	53½			
11 and 12	62½	52½			

Butt Weld, extra strong, plain ends

⅛	48½	32½	⅛	+13	+45½
¼ to ⅜	51	38	¼ & ⅜	+2½	+34½
½	56½	47½	½	32½	17½
¾	61	52	¾	37½	22½
1 to 3	63	55	1 to 2	48½	29

Lap Weld, extra strong, plain ends

2	58	50	2	40	26
2½ to 3	62	54	2½ to 4	45½	33
3½ to 6	65½	57½	4½ to 6	45	33½
7 and 8	64½	54½	7 & 8	46	33
9 and 10	63½	53½	9 to 12	41½	30
11 and 12	62½	52½			

On standard steel pipe an extra 5% off is allowed on sales to consumers while two 5's off apply on sales to jobbers. On less-than-carload shipments prices are determined by adding 20 and 25% and the carload freight rate to the base card. On structural steel pipe the base card is reduced 2 points and two 5's off are allowed to consumers and three 5's off to jobbers.

Note—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Seamless Steel Commercial Boiler Tubes and Locomotive Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh in carload lots)

		Cold Drawn	Hot Rolled
1 in. o.d.	13 B.W.G.	$ 8.60	$ 7.82
1¼ in. o.d.	13 B.W.G.	10.19	9.26
1½ in. o.d.	13 B.W.G.	11.38	10.23
1¾ in. o.d.	12 B.W.G.	12.81	11.64
2 in. o.d.	13 B.W.G.	14.35	12.94
2¼ in. o.d.	13 B.W.G.	16.00	14.54
2½ in. o.d.	12 B.W.G.	17.61	16.01
2¾ in. o.d.	12 B.W.G.	19.29	17.54
3 in. o.d.	12 B.W.G.	20.45	18.59
3½ in. o.d.	12 B.W.G.	21.45	19.50
4 in. o.d.	10 B.W.G.	41.08	37.35
4½ in. o.d.	11 B.W.G.	27.09	24.63
5 in. o.d.	10 B.W.G.	33.00	30.54
6 in. o.d.	7 B.W.G.	79.15	71.90

Extras for less-carload quantities:

25,000 lb. or ft. to 39,999 lb. or ft.	5 %
12,000 lb. or ft. to 24,999 lb. or ft.	12½ %
6,000 lb. or ft. to 11,999 lb. or ft.	25 %
2,000 lb. or ft. to 5,999 lb. or ft.	35 %
Under 2,000 lb. or ft.	50 %

Lapweld Steel and Knobbled Charcoal Iron Pressure Tubes

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

		Steel	*Iron*
1⅛ in. o.d.	13 B.W.G.	$ 9.72	$10.16
1⅜ in. o.d.	13 B.W.G.	11.06	21.94
2 in. o.d.	13 B.W.G.	12.38	17.33
2¼ in. o.d.	13 B.W.G.	13.79	19.58
2½ in. o.d.	12 B.W.G.	16.53	24.19
2¾ in. o.d.	12 W.B.G.	17.54	26.40
3 in. o.d.	12 B.W.G.	18.35	28.30
3¼ in. o.d.	11 B.W.G.	21.56	32.95
3½ in. o.d.	11 B.W.G.	22.15	36.16
4 in. o.d.	10 B.W.G.	28.66	45.36
4½ in. o.d.	10 B.W.G.	35.22	50.48
5 in. o.d.	9 B.W.G.	44.25	61.96
6 in. o.d.	7 B.W.G.	68.14	102.46

Quantity Extras:

40,000 lb. or ft.	base
25,000 lb. or ft. to 39,999 lb. or ft.	plus 5%
10,000 lb. or ft. to 24,999 lb. or ft.	plus 12½ %
2,000 lb. or ft. to 9,999 lb. or ft.	plus 25%
Under 2,000 lb. or ft.	plus 40%

CAST IRON WATER PIPE

	Per Net Ton
*6-in. and larger, del'd Chicago	$48.40
*4-in., del'd Chicago	51.40
6-in. and larger, del'd New York	45.20
4-in., del'd New York	48.20
*6-in. and larger, Birmingham	40.00
*4-in. Birmingham	43.00
6-in. and larger, f.o.b. dock, San Francisco or Los Angeles	48.00
F.o.b. dock, Seattle	48.50
4-in., f.o.b. dock, San Francisco or Los Angeles	51.00
F.o.b. dock, Seattle	51.50

Class "A" and gas pipe, $3 extra.

*Prices for lots of less than 200 tons. For 200 tons and over, 6-in. and larger is $39, Birmingham, and $47.40, delivered Chicago, and 4-in. pipe, $42, Birmingham, and $50.40 a ton, delivered Chicago.

RAILROAD MATERIALS

Rails and Track Supplies

F.o.b. Mill

Standard rails, heavier than 60 lb. per gross ton	$36.37½
Angle bars, per 100 lb.	2.55

F.o.b. Code Basing Points

Light rails (from billets) per gross ton	$35.00
Light rails (from rail steel) per gross ton	34.00

Base per 100 Lb.	
Spikes, 9/16 in. and larger	$2.40
Spikes, ½ and smaller	2.40
Tie plates, steel	1.90
Tie plates, Pacific Coast ports	2.00
Track bolts, to steam railroads	3.85
Track bolts, to jobbers, all sizes (per 100 count)	70 per cent off list

Basing points on light rails are Pittsburgh, Chicago and Birmingham; on spikes and tie plates, Pittsburgh, Chicago, Buffalo, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minneapolis, Cole., Birmingham and Pacific Coast ports; on tie plates alone, Steelton, Pa.; on spikes alone, Cleveland, Youngstown, Lebanon, Pa., Columbia, Pa., Richmond, Va.

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

	Per Cent Off List
Machine bolts	75
Carriage bolts	75
Lag bolts	75
Plow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagon	75
C.p.c. and t. square or hex. nuts, blank or tapped	75
Semi-finished hexagon nuts, U.S.S. and S.A.E., all sizes to and incl. 1 in. diameter	75
Larger than 1 in. diameter	75
Stove bolts in packages, Pittsburgh	75
Stove bolts in packages, Chicago	75
Stove bolts in packages, Cleveland	75
Stove bolts in bulk, Pittsburgh	83
Stove bolts in bulk, Chicago	83
Stove bolts in bulk, Cleveland	81
Tire bolts	60

Large Rivets

(½-in. and larger)

	Base per 100 Lb.
F.o.b. Pittsburgh or Cleveland	$2.90
F.o.b. Chicago	3.00
F.o.b. Birmingham	3.05

Small Rivets

(7/16-in. and smaller)

	Per Cent Off List
F.o.b. Pittsburgh	70 and 5
F.o.b. Cleveland	70 and 5
F.o.b. Chicago and Birm'g'm	70 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 65c. per 100 lbs. on lots of 200 lb. or more)

	Per Cent Off List
Milled cap screws, 1 in. dia. and smaller	80, 10 and 10
Milled standard set screws, case hardened, 1 in. dia. and smaller	75
Milled headless set screws, cut thread ¾ in. and smaller	75
Upset hex. head cap screws, U.S.S. or S.A.E. thread, 1 in. and smaller	85
Upset set screws, cut and oval points	75 and 10
Milled studs	65 to 65 and 10

Alloy and Stainless Steel

Alloy Steel Ingots

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Uncropped ..... $40 per gross ton

Alloy Steel Blooms, Billets and Slabs

F.o.b. Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem.
Base price, $49 a gross ton.

Alloy Steel Bars

Price del'd Detroit is $52.
F.o.b. Pittsburgh, Chicago, Buffalo, Bethlehem, Massillon or Canton.
Open-hearth grade, base ..... 2.45c.
Delivered price at Detroit is ..... 2.60c.

S.A.E. Series Numbers	Alloy Differential per 100 lb.
2000 (1% Nickel)	$0.25
2100 (2½% Nickel)	0.55
2300 (3½% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum (1.50 to 2.00 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	base
6100 Chromium Vanadium Bar	1.20
6100 Chromium Vanadium Spring Steel	0.70
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

These prices are for hot-rolled steel bars. The differential for most grades in electric furnace steel is 50c. higher. The differential for cold-drawn bars ½c. per lb. higher with separate extras. Blooms, billets and slabs under 4x4 in. or equivalent are sold on the bar base. Slabs with a section area of 16 in. and 2½ in. thick or over take the billet base. Sections 4x4 in. to 10x10 in. or equivalent carry a gross ton price, which is the net price for bars for the same analysis. Larger sizes carry extras.

Alloy Cold-Finished Bars

F.o.b. Pittsburgh, Chicago, Gary, Cleveland or Buffalo. 2.95c. base per lb.

STAINLESS STEEL No. 302

(17 to 19% Cr. 7 to 9% Ni. 0.08 to 0.20% C.)
(Base Prices f.o.b. Pittsburgh)

	Per Lb.
Forging billets	19.55c.
Rerolling slabs	15c.
Bars	23c.
Plates	26c.
Structural shapes	23c.
Sheets	33c.
Hot-rolled strip	20½c.
Cold-rolled strip	27c.
Drawn wire	23c.

Raw and Semi-Finished Steel

Carbon Steel Rerolling Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.
Uncropped ..... $29 per gross ton

Carbon Steel Forging Ingots

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Birmingham.
Uncropped ..... $31 per gross ton

Billets, Blooms and Slabs

F.o.b. Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham.

	Per Gross Ton
Rerolling	$27.00
Forging quality	35.00

Delivered Detroit

Rerolling	$30.00
Forging	38.00

Billets Only F.o.b. Duluth

Rerolling	$29.00
Forging	37.00

Sheet Bars

F.o.b. Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open-hearth or Bessemer	$28.00

Skelp

F.o.b. Pittsburgh, Chicago, Youngstown, Buffalo, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved	1.70c.
Universal	1.70c.
Sheared	1.70c.

Wire Rods

(Common, base)

	Per Gross Ton
F.o.b. Pittsburgh	$38.00
F.o.b. Cleveland	38.00
F.o.b. Chicago	39.00
F.o.b. Anderson, Ind.	39.00
F.o.b. Youngstown	39.00
F.o.b. Worcester, Mass.	40.00
F.o.b. Birmingham	41.00
F.o.b. San Francisco	47.00
F.o.b. Galveston	44.00

Pig Iron and Ferroalloys

PIG IRON

PRICES PER GROSS TON AT BASING POINTS

Basing Points	No. 2 Fdry.	Malleable	Basic	Bessemer
Everett, Mass	$19.50	$20.00	$19.00	$20.50
Bethlehem, Pa.	19.50	20.00	19.00	20.50
Birdsboro, Pa.	19.50	20.00	19.00	20.50
Swedeland, Pa.	19.50	20.00	19.00	20.50
Steelton, Pa.	....	....	19.00	....
Sparrows Point, Md.	19.50	....	19.00	....
Neville Island, Pa.	18.50	18.50	18.00	19.00
Sharpsville, Pa.	18.50	18.50	18.00	19.00
Youngstown	18.50	18.50	18.00	19.00
Buffalo	18.50	19.00	17.50	19.50
Erie, Pa.	18.50	19.00	18.00	19.50
Cleveland	18.50	18.50	18.00	19.00
Toledo, Ohio	18.50	18.50	18.00	19.00
Jackson, Ohio	20.25	20.25	19.75	20.75
Detroit	18.50	18.50	18.00	19.00
Hamilton, Ohio	18.50	18.50	18.00	19.00
Chicago	18.50	18.50	18.00	19.00
Granite City, Ill.	18.50	18.50	18.00	....
Duluth, Minn.	19.00	19.00	....	19.50
Birmingham	14.50	14.50	13.50	19.00
Provo, Utah	17.50	....	17.00	....

DELIVERED PRICES PER GROSS TON AT CONSUMING CENTERS

	No. 2 Fdry.	Malleable	Basic	Bessemer
Boston Switching District From Everett, Mass.	$20.00	$20.50	$19.50	$21.00
Brooklyn From East. Pa.	21.9289	22.4289	21.9289	22.9289
Newark or Jersey City, N. J. From East. Pa.	20.9873	21.4873	20.4873	21.9873
Philadelphia From Eastern Pa.	20.3132	20.8132	19.8132	21.3132
Cincinnati From Hamilton, Ohio	19.5807	19.5807	19.0807	20.0807
Canton, Ohio From Cleveland and Youngstown	19.3402	19.8402	19.3402	20.3402
Columbus, Ohio From Hamilton, Ohio	20.64	20.64	....	....
Mansfield, Ohio From Cleveland and Toledo	20.3832	20.3832	....	....
Indianapolis From Hamilton, Ohio	20.9289	20.9289	....	....
South Bend, Ind. From Chicago	20.6935	20.6935	....	....
Milwaukee From Chicago	19.57	19.57	....	....
St. Paul From Duluth	20.94	....	....	....
Davenport, Iowa From Chicago	20.3832	20.3832	....	....
Kansas City From Granite City	21.2178	21.2178	....	....
San Francisco, Los Angeles or Seattle. From Provo	22.315	....	....	....

Delivered prices on Southern iron for shipment to Northern points are 38c. a gross ton below delivered prices from the nearest Northern basing points.

LOW PHOSPHORUS PIG IRON

Basing points: Birdsboro, Pa., Steelton, Pa., and Standish, N. Y. $23.50

GRAY FORGE PIG IRON

Valley furnace	$18.00
Pittsburgh district furnace	18.00

CHARCOAL PIG IRON

Lake Superior furnace	$21.50
Delivered Chicago	24.7528
Delivered Buffalo	25.095

CANADA

Pig Iron

Per gross ton:

Delivered Toronto

No. 1 fdy., sil. 2.25 to 2.75	$21.00
No. 2 fdy., sil. 1.75 to 2.75	20.50
Malleable	22.50

Delivered Montreal

No. 1 fdy., sil. 2.25 to 2.75	$22.50
No. 2 fdy., sil. 1.75 to 2.25	22.00
Malleable	22.50
Basic	22.00

FERROALLOYS

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans.

	Per Gross Ton
Domestic, 80% (carload)	$85.00

Spiegeleisen

	Per Gross Ton Furnace
Domestic, 19 to 21%	$26.00
50-ton lots 3-mo. shipment	24.00
F.o.b. New Orleans	26.00

Electric Ferrosilicon

	Per Gross Ton Delivered
50% (carloads)	$77.50
50% (ton lots)	85.00
75% (carloads)	126.00
75% (ton lots)	136.00

Silvery Iron

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
6%	$22.75	12%	$29.25
7%	23.75	13%	30.75
8%	24.75	14%	32.25
9%	25.75	15%	33.75
10%	26.75	16%	35.25
11%	27.75	17%	36.75

The lower all-rail delivered price from Jackson or Buffalo is quoted with freight allowed. Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional.

Bessemer Ferrosilicon

F.o.b. Jackson, Ohio, Furnace

Per Gross Ton		*Per Gross Ton*	
10%	$27.75	14%	$33.25
11%	28.75	15%	34.75
12%	30.25	16%	36.25
13%	31.75	17%	37.75

Manganese 2 to 3%, $1 a ton additional. For each unit of manganese over 3%, $1 a ton additional. Phosphorus 0.75% or over, $1 ton additional.

Base prices at Buffalo are $1.25 a ton higher than at Jackson.

Other Ferroalloys

Ferrotungsten, per lb. contained W. del., carloads	$1.35 to $1.45
Ferrotungsten, less carloads	1.45 to 1.55
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr. per lb. contained Cr. delivered, in car loads	10.00c
Ferrochromium, 2% carbon	16.50c. to 17.00c.
Ferrochromium, 1% carbon	17.50c. to 18.00c.
Ferrochromium, 0.10% carbon	19.50c. to 20.00
Ferrochromium, 0.06% carbon	20.00c. to 20.50c.
Ferrovanadium, del. per lb. contained V.	$2.70 to $2.90
Ferrocarbontitanium, 15 to 18% Ti, 6 to 8% C. f.o.b. furnace carload and contract per net ton	$137.50
Ferrophosphorus, electric, or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton with $2 unitage	50.00
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton with $2.75 unitage	65.00
Ferromolybdenum, per lb. Mo., del.	95c.
Calcium molybdate, per lb. Mo., del.	80c.
Silico spiegel, per ton, f.o.b. furnace, carloads	$38.00
Ton lots or less, per ton	45.50
Silico-manganese, gross ton, delivered.	
2.50% carbon grade	90.00
2% carbon grade	95.00
1% carbon grade	105.00
Spot prices	$5 a ton higher

Iron and Steel Scrap

PITTSBURGH

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$13.00 to $13.50
No. 2 heavy melting steel	11.75 to 12.25
No. 2 railroad wrought	13.50 to 14.00
Scrap rails	14.00 to 14.50
Rails, 3 ft. and under	15.50 to 16.00
Compressed sheet steel	13.25 to 13.75
Hand bundled sheet steel	11.75 to 12.25
Hvy. steel axle turnings	11.50 to 12.00
Machine shop turnings	9.50 to 10.00
Short shov. turnings	9.50 to 10.00
Short mixed borings and turnings	8.50 to 9.00
Cast iron borings	8.50 to 9.00
Cast iron carwheels	14.00 to 14.50
Heavy breakable cast	12.25 to 12.75
No. 1 cast	14.00 to 14.50
Railr. knuckles and couplers	15.00 to 15.50
Rail. coil and leaf springs	15.50 to 16.00
Rolled steel wheels	15.50 to 16.00
Low. phos. billet crops	16.50 to 17.00
Low phos. sheet bar crops	15.50 to 16.00
Low phos. punchings	15.00 to 15.50
Low phos. plate scrap	14.50 to 15.00
Steel car axles	14.50 to 15.00

CHICAGO

Delivered Chicago district consumers:

	Per Gross Ton
Heavy melting steel	$12.25 to $12.75
Automobile hvy. melt. steel	11.25 to 11.75
Shoveling steel	12.25 to 12.75
Hydraulic comp. sheets	11.25 to 11.75
Drop forge flashings	9.50 to 10.00
No. 1 busheling	11.00 to 11.50
Rolled carwheels	12.75 to 13.25
Railroad tires	13.00 to 13.50
Railroad leaf springs	12.75 to 13.25
Axle turnings	11.00 to 11.50
Steel couplers and knuckles	13.25 to 13.75
Coil springs	14.25 to 14.75
Axle turnings (elec. fur.)	11.75 to 12.25
Low phos. punchings	14.50 to 15.00
Low phos. plates, 12 in. and under	14.50 to 15.00
Cast iron borings	6.00 to 6.50
Short shoveling turnings	7.50 to 8.00
Machine shop turnings	7.00 to 7.50
Rerolling rails	13.50 to 14.00
Steel rails, less than 3 ft.	13.50 to 14.00
Steel rails, less than 2 ft.	15.00 to 15.50
Angle bars, steel	14.00 to 14.50
Cast iron carwheels	12.75 to 13.25
Railroad malleable	14.50 to 15.00
Agricultural malleable	10.25 to 10.75

	Per Net Ton
Iron car axles	$15.50 to $16.00
Steel car axles	14.75 to 15.25
No. 1 railroad wrought	9.50 to 10.00
No. 2 railroad wrought	11.00 to 11.50
No. 2 busheling	6.50 to 7.00
Locomotive tires, smooth	11.50 to 12.00
Pipes and flues	7.00 to 7.50
No. 1 machinery cast	11.25 to 11.75
Clean automobile cast	10.50 to 11.00
No. 1 railroad cast	9.50 to 10.00
No. 1 agricultural cast	9.75 to 10.25
Stove plate	8.00 to 8.50
Grate bars	8.00 to 8.50
Brake shoes	8.00 to 8.50

PHILADELPHIA

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.00
No. 2 heavy melting steel	$11.00 to 11.50
Hydraulic compressed, new	10.00 to 10.50
Hydraulic compressed, old	8.50 to 9.00
Steel rails for rolling	14.00 to 14.50
Cast iron carwheels	12.50 to 13.00
Heavy breakable cast	11.25 to 11.50
No. 1 cast	12.50 to 13.00
Stove plate (steel works)	9.00 to 9.50
Railroad malleable	13.50 to 14.00
Machine shop turnings	7.50 to 8.00
No. 1 blast furnace	5.50 to 6.00
Cast borings	5.50 to 6.00
Heavy axle turnings	9.50 to 10.00
No. 1 low phos. heavy	14.50 to 15.00
Couplers and knuckles	14.50 to 15.00
Rolled steel wheels	14.50 to 15.00
Steel axles	16.00 to 16.50
Shafting	18.00 to 18.50
No. 1 railroad wrought	12.00 to 12.50
Spec. iron and steel pipe	9.50 to 10.00
Bundled sheets	9.50 to 10.00
No. 1 forge fire	10.50 to 11.00
Cast borings (chem.)	10.50 to 13.00

CINCINNATI

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$10.00 to $10.50
No. 2 heavy melting steel	8.00 to 8.50
Scrap rails for melting	9.25 to 9.75
Loose sheet clippings	6.00 to 6.50
Bundled sheets	7.25 to 7.75
Cast iron borings	5.50 to 6.00
Machine shop turnings	5.75 to 6.25
No. 1 busheling	7.25 to 7.75
No. 2 busheling	3.75 to 4.25
Rails for rolling	10.25 to 10.75
No. 1 locomotive tires	8.50 to 9.00
Short rails	13.00 to 13.50
Cast iron carwheels	9.50 to 10.00
No. 1 machinery cast	10.50 to 11.00
No. 1 railroad cast	9.75 to 10.25
Burnt cast	7.25 to 7.75
Stove plate	7.25 to 7.75
Agricultural malleable	9.25 to 9.75
Railroad malleable	10.50 to 11.00

CLEVELAND

Per gross ton delivered consumers' yards:

No. 1 heavy melting steel	$12.25 to $12.50
No. 2 heavy melting steel	11.25 to 11.50
Compressed sheet steel	11.00 to 11.50
Light bundled sheet stampings	9.25 to 9.75
Drop forge flashings	10.50 to 11.00
Machine shop turnings	7.75 to 8.25
Short shoveling turnings	8.00 to 8.50
No. 1 busheling	10.50 to 11.00
Steel axle turnings	10.50 to 11.00
Low phos. billet crops	15.00 to 15.50
Cast iron borings	7.75 to 8.25
Mixed borings and short turnings	7.75 to 8.25
No. 2 busheling	7.75 to 8.25
No. 1 cast	13.50 to 14.00
Railroad grate bars	7.00 to 7.50
Stove plate	7.50 to 8.00
Rails under 3 ft.	15.50 to 16.00
Rails for rolling	15.50 to 16.00
Railroad malleable	15.50 to 16.00
Cast iron carwheels	10.75 to 11.00

BUFFALO

Per gross ton, f.o.b. Buffalo consumers' plants:

No. 1 heavy melting steel	$12.00 to $12.50
No. 2 heavy melting scrap	11.00 to 11.50
Scrap rails	12.00 to 12.50
New hydraul. comp. sheets	11.00 to 11.50
Old hydraul. comp. sheets	9.50 to 10.00
Drop forge flashings	10.50 to 11.00
No. 1 busheling	11.00 to 11.50
Hvy. steel axle turnings	10.50 to 11.00
Machine shop turnings	5.50 to 6.00
Knuckles and couplers	13.00 to 14.00
Coil and leaf springs	13.00 to 14.00
Rolled steel wheels	13.00 to 14.00
Low phos. billet crops	14.50 to 15.00
Short shov. steel turnings	7.50 to 8.00
Short mixed borings and turnings	7.50 to 8.00
Cast iron borings	7.50 to 8.00
No. 2 busheling	7.00 to 7.50
Steel car axles	12.50 to 13.00
Iron axles	12.50 to 13.00
No. 1 machinery cast	12.50 to 13.00
No. 1 cupola cast	11.50 to 12.00
Stove plate	10.00 to 10.50
Steel rails, 3 ft. and under	14.50 to 15.00
Cast iron carwheels	12.00 to 12.50
Railroad malleable	14.00 to 14.50
Chemical borings	9.00 to 9.50

BOSTON

Dealers' buying prices per gross ton:

*No. 1 heavy melting steel	$9.50 to $9.75
No. 1 heavy melting steel	7.15 to 7.40
*Scrap rails	9.50 to 9.75
Scrap rails	7.25 to 7.50
*No. 2 steel	8.50 to 8.75
No. 2 steel	6.15 to 6.40
Breakable cast	6.25 to 6.50
Machine shop turnings	3.50 to 3.65
Bundled skeleton, long	6.00 to 6.15
Forge flashings	6.00 to 6.15
Shafting	13.00 to 13.25
Steel car axles	12.50 to 13.00
Cast iron borings, chemical	5.00 to 7.00
*No. 1 textile cast	8.75 to 9.10

Per gross ton delivered consumers' yards:

Textile cast	9.50 to 10.00
No. 1 machinery cast	9.00 to 9.50
Stove plate	6.00 to 6.50
Railroad malleable	11.00 to 11.50

* Delivered local army base.

NEW YORK

Dealers' buying prices per gross ton:

No. 1 heavy melting steel	$8.50 to $8.75*
No. 2 heavy melting steel	7.50 to 7.75*
Heavy breakable cast	6.75 to 7.25
No. 1 machinery cast	7.00 to 7.50
No. 2 cast	†6.50
Stove plate	†6.50
Steel car axles	13.50 to 14.00
Shafting	13.50 to 13.75
No. 1 railroad wrought	7.75 to 8.25
No. 1 yard wrought, long	6.75 to 7.25
Spec. iron and steel pipe	5.50 to 6.00
Forge fire	6.50 to 7.00
Rails for rolling	9.00 to 10.00
Short shoveling turnings	3.00 to 3.25
Machine shop turnings	3.50 to 4.00
Cast borings	3.50 to 3.75
No. 1 blast furnace	2.00 to 2.50
Cast borings (chemical)	11.00 to 11.50
Unprepared yard iron and steel	4.50 to 5.00

Per gross ton, delivered local foundries:

No. 1 machinery cast	$10.50
No. 1 hvy. cast (cupola size)	9.50
No. 2 cast	8.00

† Loading on barge.
*25c. higher offered to nearby New Jersey points.

BIRMINGHAM

Per gross ton delivered consumers' yards:

Heavy melting steel	$7.50 to $8.00
Scrap steel rails	10.00 to 10.50
Short shoveling turnings	7.00
Stove plates	7.00
Steel axles	11.50
Iron axles	11.50
No. 1 railroad wrought	7.00
Rails for rolling	12.50
No. 1 cast	10.00 to 10.50
Tramcar wheels	10.00

ST. LOUIS

Dealers' buying prices per gross ton:

Selected heavy steel	$10.50 to $11.00
No. 1 heavy melting	10.00 to 10.50
No. 2 heavy melting	8.75 to 9.25
No. 1 locomotive tires	9.75 to 10.25
Misc. stand-sec. rails	11.50 to 12.00
Railroad springs	12.00 to 12.50
Bundled sheets	6.50 to 7.00
No. 2 railroad wrought	10.00 to 10.50
No. 1 busheling	5.00 to 5.50
Cast iron borings and shoveling turnings	3.00 to 3.50
Rails for rolling	12.00 to 12.50
Machine shop turnings	2.75 to 3.25
Heavy turnings	8.00 to 8.50
Steel car axles	12.50 to 13.00
Iron car axles	15.00 to 16.00
No. 1 railroad wrought	7.00 to 7.50
Steel rails less than 3 ft.	13.00 to 13.50
Steel angle bars	12.00 to 12.50
Cast iron carwheels	9.00 to 9.50
No. 1 machinery cast	9.50 to 10.00
Railroad malleable	13.00 to 13.50
No. 1 railroad cast	9.00 to 9.50
Stove plate	6.50 to 7.00
Agricult. malleable	8.50 to 9.00

DETROIT

Dealers' buying prices per gross ton:

Heavy melting steel	$9.50 to $10.00
Borings and short turnings	5.50 to 6.00
Long turnings	$5.25 to $5.75
No. 1 machinery cast	12.50 to 13.00
Automotive cast	13.00 to 13.50
Hydraulic comp. sheets	9.75 to 10.25
Stove plate	7.75 to 8.25
New factory busheling	8.75 to 9.25
Old No. 2 busheling	5.00 to 5.50
Sheet clippings	6.75 to 7.25
Flashings	8.25 to 8.75
Low phos. plate scrap	10.00 to 10.50

CANADA

Dealers' buying prices per gross ton:

	Toronto	Montreal
Heavy melting steel	$8.00	$7.50
Rails, scrap	8.50	8.00
Machine shop turnings	3.50	3.50
Boiler plate	5.00	5.00
Heavy axle turnings	4.50	4.00
Cast borings	4.50	4.00
Steel borings	3.00	3.00
Wrought pipe	4.00	4.00
Steel axles	8.00	8.50
Axles, wrought iron	8.00	8.50
No. 1 machinery cast	9.50	9.00
Stove plate	6.50	6.00
Standard carwheels	7.75	7.00
Malleable	7.50	7.00

ORES, FLUORSPAR, COKE, FUEL, REFRACTORIES

Lake Superior Ores

Delivered Lower Lake Ports

	Per Gross Ton
Old range, Bessemer, 51.50% iron	$4.80
Old range, non-Bessemer, 51.50% iron	4.65
Mesabi, Bessemer, 51.50% iron	4.65
Mesabi, non-Bessemer, 51.50% iron	.50
High phosphorus, 51.50% iron	4.40

Foreign Ore

C.i.f. Philadelphia or Baltimore

	Per Unit
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algeria	10.50c.
Iron, low phos., Swedish, average 68½% iron	10.50c.
Iron, basic or foundry, Swedish, aver. 65% iron	9.50c.
Iron, basic or foundry, Russian, aver. 65% iron	9.50c.
Manganese, Caucasian, washed 52%	26c.
Manganese, African, Indian, 44-48%	22c.
Manganese, African, Indian, 49-51%	24c.
Manganese, Brazilian, 46 to 48½%	20c.

	Per Net Ton Unit
Tungsten, Chinese, wolframite, duty paid, delivered	$15.50 to $16.00
Tungsten, domestic, scheelite, delivered	15.00

	Per Gross Ton
Chrome, 45% Cr_2O_3, lump, c.i.f. Atlantic Seaboard (African)	$17.50
45 to 46% Cr_2O_3 (Turkish)	$16.00 to 16.50
48% Cr_2O_3 (African)	20.50
45% min. Cr_2O_3 (Turkish)	19.25
Chrome concentrate, 50% and over Cr_2O_3, c.i.f. Atlantic Seaboard	22.00
52% Cr_2O_3 (Turkish)	21.75
48 to 49% Cr_2O_3 (Turkish)	19.25

Fluorspar

	Per Net Ton
Domestic, washed gravel, 85-5, f.o.b. Kentucky and Illinois mines for all-rail shipment	$13.50
Same grade for Ohio River barge shipment for Kentucky and Illinois River landings	16.50
No. 2 lump, 85-5, f.o.b. Kentucky and Illinois mines	16.50
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic ports, duty paid	20.00
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	30.00

COKE, COAL AND FUEL OIL

Coke

	Per Net Ton
Furnace, f.o.b. Connellsville Prompt	$3.60 to $3.75
Foundry, f.o.b. Connellsville Prompt	4.25 to 5.75
Foundry, by-product, Chicago ovens, for delivery outside switching district	9.00
Foundry, by-product, delivered in Chicago switching district	9.75
Foundry, by-product, New England, delivered	11.00
Foundry, by-product, Newark or Jersey City, del'd	9.24 to 9.72
Foundry, by-product, Phila.	9.03
Foundry, by-product, Cleveland, delivered	9.75
Foundry, Birmingham	6.00
Foundry, by-product, St. Louis, f.o.b. ovens	$8.00
Foundry, by-product, del'd St. Louis	9.00
Foundry, from Birmingham, f.o.b. cars docks, Pacific ports	14.75

Coal

	Per Net Ton
Mine run steam coal, f.o.b. W. Pa. mines	$1.60 to $1.80
Mine run coking coal, f.o.b. W. Pa.	1.90 to 2.10
Gas coal, ¾-in., f.o.b. Pa. mines	2.00 to 2.50
Mine run gas coal, f.o.b. Pa. mines	1.90 to 2.10
Steam slack, f.o.b. W. Pa. mines	1.15 to 1.40
Gas slack, f.o.b. W. Pa. mines	1.35 to 1.60

Fuel Oil

	Per Gal. f.o.b. Bayonne, N. J.
No. 3 distillate	4.25c.
No. 4 industrial	3.87½c.

	Per Gal. f.o.b. Baltimore
No. 3 distillate	4.25c.
No. 4 industrial	3.87½c.

	Per Gal. del'd Chicago
No. 3 industrial fuel oil	4.75c.
No. 5 industrial fuel oil	3.75c.

	Per Gal. f.o.b. Cleveland
No. 3 distillate	5.25c.
No. 4 industrial	3.12½c.
No. 5 industrial	4.00c

REFRACTORIES

Fire Clay Brick

	Per 1000 f.o.b. Works High-heat Duty Brick	Intermediate Duty Brick
Pennsylvania	$45.00	$40.00
Maryland	50.00	40.00
New Jersey	50.00	43.00
Ohio	45.00	40.00
Kentucky	45.00	40.00
Missouri	45.00	40.00
Illinois	45.00	40.00
Ground fire clay, per ton	7.00	

Silica Brick

	Per 1000 f.o.b. Works
Pennsylvania	$45.00
Chicago District	54.00
Birmingham	55.00
Silica clay, per net ton	8.00

Chrome Brick

	Per Net Ton
Standard, f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	$45.00
Chemically bonded f.o.b. Baltimore, Plymouth Meeting and Chester, Pa.	45.00

Magnesite Brick

	Per Net Ton
Standard, f.o.b. Baltimore and Chester, Pa.	$45.00
Chemically bonded, f.o.b. Baltimore	55.00

Grain Magnesite

	Per Net Ton
Imported f.o.b. Baltimore and Chester, Pa.	$45.00
Domestic, f.o.b. Baltimore and Chester	40.00
Domestic, f.o.b. Chewelah, Wash.	22.00

Warehouse Prices for Steel Products

PITTSBURGH

Base per Lb.

Plates	3.15c.
Structural shapes	3.15c.
Soft steel bars and small shapes	2.95c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock:	
Rounds and hexagons	3.20c.
Squares and flats	3.20c.
Hoops and bands under ¼ in.	3.20c.
Hot-rolled anealed sheets (No. 24), 25 or more bundles	3.30c.
Galv. sheets (No. 24), 25 or more bundles	3.95c.
Hot-rolled sheets (No. 10)	2.95c.
Galv. corrug. sheets (No. 28), per square (more than 3750 lb.)	$3.69
Spikes, large	2.90c.
Track bolts, all sizes, per 100 count, 65 per cent off list.	
Machine bolts, 100 count, 65 per cent off list.	
Carriage bolts, 100 count, 65 per cent off list.	
Nuts, all styles, 100 count, 65 per cent off list.	
Large rivets, base per 100 lb.	$3.50
Wire, black, soft ann'l'd, base per 100 l.b	*2.70
Wire, galv. soft, base per 100 lb.	*2.925
Common wire nails, per keg	*2.834
Cement coated nails, per keg	*2.834

On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 9999 lbs.

*Delivered in Pittsburgh switching district.

CHICAGO

Base per Lb.

Plates and structural shapes	3.20c.
Soft steel bars, rounds	3.00c.
Soft steel bars, squares and hexagons	3.15c.
Cold-fin. steel bars:	
Rounds and hexagons	3.35c.
Flats and squares	3.35c.
Hot-rolled strip	3.30c.
Hot-rolled annealed sheets (No. 24)	3.85c.
Galv. sheets (No. 24)	4.55c.
Hot-rolled sheets (No. 10)	3.05c.
Spikes (keg lots)	3.50c.
Track bolts (keg lots)	4.65c.
Rivets, structural (keg lots)	3.65c.
Rivets, boiler (keg lots)	3.75c.

Per Cent Off List

Machine bolts	*70
Carriage bolts	*70
Lag screws	*70
Hot-pressed nuts, sq. tap. or	*70
Hot-pressed nuts, sq. tap or blank	*70
Hot-pressed nuts, hex. tap or	
Hot-pressed nuts, hex. tap or blank	*70
Hex. head cap screws	87½
Cut point set screws	80
Flat head bright wood screws	50 and 20
Spring cotters	55
Stove bolts in full packages	70
Rd. hd. tank rivets, 7/16 in. and smaller	57½
Wrought washers	$4.50 off list
Black ann'l'd wire per 100 lb.	$3.85
Com. wire nails, base per keg	2.95†
Cement c't'd nails, base per keg	2.95†

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. All prices are f.o.b. consumers' plants within the Chicago switching district.

*These are quotations delivered to city trade for quantities of 100 lb. or more. For lots of less than 100 lb., the quotation is 65 per cent off. Discounts applying to country trade are 70 per cent off, f.o.b. Chicago, with full or partial freight allowed up to 50c. per 100 lb.

†Prices for city and suburbs only.

NEW YORK

Base per Lb.

Plates, ¼ in. and heavier	3.40c.
Structural shapes	3.37c.
Soft steel bars, rounds	3.31c.
Iron bars	3.26c.
Iron bars, swed. charcoal	6.75c. to 7.00c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons	3.81c.
Flats and squares	3.81c.
Cold-rolled; strip, soft and quarter hard	3.36c.
Hoops	3.56c.
Bands	3.56c.
Hot-rolled sheets (No. 10)	3.31c.
Hot-rolled ann'l'd sheets (No. 24*)	3.89c.
Galvanized sheets (No. 24*)	special
Long terne sheets (No. 24)	5.25c.
Standard tool steel	11.00c.
Wire, black annealed (No. 10)	3.40c.
Wire, galv. (No. 10)	3.75c.
Wire steel, 1 x ¼ in. and larger	3.75c.
Open hearth spring steel	4.00c. to 10.00c.
Common wire nails, base, per keg	$3.21

Per Cent Off List

Machine bolts, square head and nut:	
All diameters	70 and 10
Carriage bolts, cut thread:	
All diameters	65 and 10

Boiler tubes:	Per 100 Ft.
Lap welded, 2-in.	$18.95
Seamless welded, 2-in.	19.24
Charcoal iron, 2-in.	24.94
Charcoal iron 4-in.	63.65

*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.

ST. LOUIS

Base per Lb.

Plates and struc. shapes	3.45c.
Bars, soft steel (rounds and flats)	3.25c.
Bars, soft rteel (squares, hexagons, ovals, half ovals and half rounds)	3.40c.
Cold-fin. rounds, shafting, screw stocks	3.60c.
Hot-rolled annealed sheets (No. 24)	4.10c.
Galv. sheets (No. 24)	4.65c.
Hot-rolled sheets (No. 10)	3.20c.
Black corrug. sheets (No. 24)	4.10c.
*Galv. corrug. sheets	4.65c.
Structural rivets	4.00c.
Boiler rivets	4.10c.

Per Cent Off List

Tank rivets, 7/16 in. and smaller	55
Machine and carriage bolts, lag screws, fitting up bolts, bolt ends, plow bolts, hot-pressed nuts, square and hexagon, tapped or blank, semi-finished nuts:	
All quantities	70

*No. 26 and lighter take special prices.

PHILADELPHIA

Base per Lb.

*Plates, ¼-in. and heavier	2.98c.
*Structural shapes	2.98c.
*Soft steel bars, small shapes, iron bars (except bands)	3.03c.
‡Reinforc. steel bars, sq. twisted and deformed	2.96c.
Cold-finished steel bars	3.61c.
*Steel hoops	3.43c.
*Steel bands, No. 12 and 3/16 in. incl.	3.18c.
Spring steel	5.00c.
†Hot-rolled anenl. sheets (No. 24)	3.65c.
†Galvanized sheets (No. 24)	4.40c.
*Hot-rolled annealed sheets (No. 10)	3.08c.
Diam. pat. floor plates, ¼ in.	4.95c.
Swedish iron bars	6.25c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

*Base prices subject to deduction on orders aggregating 4000 lb. or over.

†For 50 bundles or over.

‡For less than 2000 lb.

CLEVELAND

Base per Lb.

Plates and struc. shapes	3.31c.
Soft steel bars	3.00c.
Reinforc. steel bars	2.10c.
Cold-finished steel bars	3.25c.
Flat-rolled steel under ¼ in.	3.36c.
Cold-finished strip	†3.00c.
Hot-rolled anealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 24)	4.61c.
Hot-rolled sheets (No. 10)	3.11c.
Hot-rolled 3/16 in. 24 to 48 in. wide sheets	3.56c.
*Black ann'l'd wire, per 100 lb.	$2.75
*No. 9 galv. wire, per 100 lb.	3.10
*Com. wire nails, base per keg	2.70

†Outside delivery 10c. less.

*For 5000 lb. cr less.

CINCINNATI

Base per Lb.

Plates and struc. shapes	3.42c.
Bars, rounds, flats and angles	3.22c.
Other shapes	3.37c.
Rail steel reinforc. bars	3.25c.
Hoops and bands, 3/16 in. and lighter	3.47c.
Cold-finished bars	3.57c.
Hot-rolled annealed sheets (No. 24)	4.02c.
Galv. sheets (No. 24)	4.72c.
Hot-rolled sheets (No. 10)	3.22c.
Structural rivets	4.35c.
Small rivets	55 per cent off list
No. 9 ann'l'd wire, per 100 lb. (1000 lb. or over)	$2.88
Com. wire nails, base per keg:	
Any quantity less than carload	3.04
Cement c't'd nails, base 100-lb. keg.	3.50
Chain, 1in. per 100 lb.	8.35

Net per 100 Ft.

Seamless steel boiler tubes, 2-in.	$20.37
4-in.	48.14
Lap-welded steel boiler tubes, 2-in.	19.38
4-in.	45.32

BUFFALO

Base per Lb.

Plates	3.38c.
Struc. shapes	3.25c.
Soft steel bars	3.05c.
Reinforcing bars	2.60c.
Cold-fin. flats and sq.	3.40c.
Round and hex.	3.40c.
Cold-rolled strip steel	3.19c.
Hot-rolled annealed sheets (No. 24)	4.06c.
Heavy hot-rolled sheets (3/16 in., 24 to 48 in. wide)	3.63c.
Galv. sheets (No. 24)	4.70c.
Bands	3.43c.
Hoops	3.43c.
Heavy hot-rolled sheets	3.18c.
Com. wire nails, base per keg	$3.35
Black wire, base per 100 lb. (2500-lb. lots or under)	3.55
(Over 2500 lb.)	3.45

BOSTON

Base per Lb.

Beams, channels, angles, tees, zees	3.54c.
H beams and shapes	3.54c.
Plates—Sheered, tank and univ. mill, ¼ in. thick and heavier	3.56c.
Floor plates, diamond pattern	5.36c.
Bar and bar shapes (mild steel)	3.45c.
Bands 3/16 in. thick and No. 12 ga. incl.	3.65c. to 4.65c.
Half rounds, half ovals, ovals and bevels	4.70c.
Tire steel	4.70c.
Cold-rolled strip steel	3.245c.
Cold-finished rounds, squares and hexagons	3.90c.
Cold-finished flats	3.75c.
Blue annealed sheets, No. 10 ga.	3.65c.
One pass cold-rolled sheets No. 24 ga.	5.20c.
Galvanized steel sheets, No. 24 ga.	5.90c.
Lead coated sheets, No. 24 ga.	6.85c.

Prices delivered by truck in metropolitan Boston, subject to quantity differentials.

DETROIT

Base per Lb.

Soft steel bars	3.09c.
Structural shapes	3.42c.
Plates	3.42c.
Floor plates	5.17c.
Hot-rolled annealed sheets (No. 24)	3.94c.
Hot-rolled sheets (No. 10)	3.14c.
Galvanized sheets (No. 24)	4.72c.
Bands	3.39c.
Hoops	3.39c.
Cold-finished bars	3.49c.
Cold-rolled strip	3.13c.
Hot-rolled alloy steel (S.A.E. 3100 Series)	5.29c.*
Bolts and nuts	70 and 5 per cent off list

Prices delivered by truck in metropolitan Detroit, subject to quantity differentials.

*Price applies to 1,000 lb. and over.

MILWAUKEE

Base per Lb.

Plates and structural shapes	3.31c.
Soft steel bars, rounds up to 8 in., flats and fillet angles	3.11c.
Soft steel bars, squares and hexagons	3.26c.
Hot-rolled strip	3.41c.
Hot-rolled sheets (No. 10)	3.16c.
Hot-rolled annealed sheets (No. 24)	3.96c.
Galvanized sheets (No. 20)	4.66c.
Cold-finished steel bars	3.46c.
Cold-rolled strip	3.33c.
Structural rivets (keg lots)	3.86c.
Boiler rivets, cone head (keg lots)	3.96c.
Track spikes (keg lots)	3.71c.
Track bolts (keg lots)	4.86c.
Black annealed wire	3.25c.
Com. wire nails	2.95c.
Cement coated nails	2.95c.

Per Cent Off List

Machine bolts	70 and 10
Carriage bolts	70 and 10
Hot-pressed nuts, sq. and hex. tapped or blank (keg lots)	70 and 10

Prices given above are delivered Milwaukee.

On plates, shapes, bars, hot-rolled strip and heavy hot-rolled sheets, the base applies on orders of 400 to 9999 lb. On galvanized and No. 24 hot-rolled annealed sheets the prices given apply on orders of 400 to 1500 lb. On cold-finished bars the prices are for orders of 1000 lb. or more of a size.

ST. PAUL

Base per Lb.

Mild steel bars, rounds	3.25c.
Structural shapes	3.45c.
Plates	3.45c.
Cold-finished bars	3.87c.
Bands and hoops	3.55c.
Hot-rolled annealed sheets, No. 24	3.90c.
Galvanized sheets, No. 24	4.50c.
Cold-rolled sheets, No. 20	4.95c.

On mild steel bars, shapes, plates and hoops and bands the base applies on 400 to 14,999 lb. On cold-finished bars, hot-rolled sheets, galvanized sheets and cold-rolled sheets base applies on 15,000 lb. and over.

BALTIMORE

Base per Lb.

*Mild steel bars	2.95c.
*Iron bars	2.95c.
*Reinforcing bars	2.95c.
*Structural shapes	3.00c.
†Plates	3.00c.
†Hot-rolled sheets, No. 10	3.10c.
‡Hot-rolled annealed sheets, No. 24	3.60c.
‡Galvanized sheets, No. 24	4.30c.
*Bands	3.50c.
*Hoops	3.45c.
§Cold-rolled rounds	3.58c.
§Cold-rolled squares, hex. and flats	3.58c.
Rivets	4.40c.
Bolts and nuts, per cent off list	60 and 10

*Quantity extras per size apply. †Quantity extras per thickness apply. Hot-rolled quantity extras are: 2000 lb. and over, base; 1500 lb. to 1999 lb., add 15c. per 100 lb.; 1000 lb. to 1499 lb., add 30c.; 0 to 999 lb., add 50c.

‡50 bundles and over, base. For 1 to 9 bundles add 50c. per 100 lb.; for 10 to 49 bundles add 25c.

§Base for 1000 lb. and over. For 500 to 999 lb. add 25c. per 100 lb.; for 300 to 499 lb. add 75c.; for 0 to 299 lb. add $1.25.

CHATTANOOGA

Base per Lb.

Mild steel bars	3.31c.
Iron bars	3.31c.
Reinforcing bars	3.31c.
Structural shapes	3.56c.
Plates	3.56c.
Hot-rolled sheets, No. 10	3.36c.
Hot-rolled annealed sheets, No. 24	4.21c.
Galvanized sheets, No. 24	4.86c.
Steel bands	3.61c.
Cold-finished bars	3.98c.

MEMPHIS

Base per Lb.

Mild steel bars	3.47c.
Shapes, bar size	3.47c.
Iron bars	3.47c.
Structural shapes	3.67c.
Plates	3.67c.
Hot-rolled sheets, No. 10	3.47c.
Hot-rolled annealed sheets, No. 24	4.27c.
Galvanized sheets, No. 24	4.97c.
Steel bands	3.72c.
Cold-drawn rounds	3.89c.
Cold-drawn flats, squares, hexagons	5.89c.
Structural rivets	4.25c.
Bolts and nuts, per cent off list	65
Small rivets, per cent off list	50

NEW ORLEANS

Base per Lb

Mild steel bars	3.35c.
Reinforcing bars	3.50c.
Structural shapes	3.55c.
Plates	3.55c.
Hot-rolled sheets, No. 10	3.55c.
Hot-rolled annealed sheets, No. 24	4.50c.
Galvanized sheets, No. 24	4.95c.
Steel bands	3.95c
Cold-finished steel bars	4.15c.
Structural rivets	4.35c.
Boiler rivets	4.25c.
Common wire nails, base per keg	$3.05
Bolts and nuts, per cent off list	70

PACIFIC COAST

Base per Lb.

	San Francisco	Los Angeles	Seattle
Plates, tank and U. M.	3.50c.	3.60c.	3.55c.
Shapes, standard	3.50c.	3.60c.	3.55c.
Soft steel bars	3.50c.	3.60c.	3.70c.
Reinforcing bars, f.o.b. cars dock			
Pacific ports	2.45c.	2.45c.	2.45c.
Hot-rolled annealed sheets (No. 24)	4.25c.	4.35c.	4.40c.
Hot-rolled sheets (No. 10)	3.60c.	3.70c.	3.75c.
Galv. sheets (No. 24)	5.00c.	4.95c.	5.00c.
Cold finished steel			
Rounds	5.80c.	5.85c.	6.00c.
Squares and hexagons	7.05c.	7.10c.	7.25c.
Flats	7.55c.	7.60c.	8.25c.
Common wire nails —base per keg less carload	$3.20	$3.20	$3.20

All items subject to differentials for quantity.

TOOL STEEL

Prices are same for warehouse distribution at all points on or East of Mississippi River. West of Mississippi quotations are 1c. a lb. higher.

Base per Lb.

High speed	57c.
High carbon chrome	37c.
Oil hardening	22c.
Extra	17c.
Regular	14c.

Cleveland-Lorain Rate Rises to 64 Per Cent

Further Slight Gain in Demand From Automotive Industry — Pig Iron Shipments Expand—Fluorspar Advanced

CLEVELAND, Oct. 22.—For the second consecutive week ingot output in the Cleveland-Lorain territory has advanced and is now 64 per cent of capacity, a gain of three points. Republic Steel Corpn. put on two open-hearth furnaces at its Corrigan-McKinney plant and one open-hearth was taken off in Lorain.

The volume of business in finished steel shows little change and most mills report that the tonnage they have entered so far this month is running ahead of September. In finishing departments operations of some sheet mills have been increased, but local hot and cold strip mills reduced their schedules somewhat this week.

Demand from the automotive industry continues to gain slightly from week to week as production of new motor car models is stepped up. Miscellaneous demand for sheets continues fairly heavy, but orders for hot-rolled bars from miscellaneous sources are less active than earlier in the month. Miscellaneous consumers as a rule are placing smaller lots of bars than recently.

The construction field does not show much evidence of activity. Hope was raised by the recently well publicized program of grade crossing elimination work in Ohio to be carried out with WPA funds. However, the amount of structural material that it was expected this work would take has sharply dwindled. Late estimates are that both bridge and highway work that will be carried out with the $7,500,000 that has been allotted to Ohio for highways and bridges will not require more than 7500 tons of steel.

Some of the railroads centering here have given indications that they will make liberal purchases of new equipment in 1936, but it will be several months before their programs are developed. At present railroad demand is negligible.

Pig Iron

With an increased demand from motor car foundries, shipping orders retain a good lead over September. One leading Lake furnace interest so far this month has shipped over 30 per cent more iron than during the corresponding part of September. Sales are holding up fairly well, although orders do not average as large as a few weeks ago. Orders supplementing previous purchases for the quarter comprise considerable of the new business. These are coming from foundries that expect to need more iron during the remainder of the quarter than they originally bought.

Sheets

The demand from the automotive industry continues to expand. Orders are fairly numerous, but none is for large tonnage. Local stamping plants doing automotive work are getting busier and good specifications are coming from this source. Miscellaneous demand for sheets from makers of washing machines, tubs, stoves and other household equipment continues good. Prices are firm. The local sheet mills, including the 72-in.

For heating corrosive solutions without dilution

The acid heating unit or heat exchanger shown above is a new development for the heating or cooling of corrosive solutions. All parts subject to corrosion are made of corrosion-resisting materials.

Depending upon the solution to be heated or cooled, and the temperature desired, the unit will satisfactorily handle from 10 to 50 g.p.m. For greater capacities, sufficient units can be manifolded for either series or parallel flow.

When used as a heating or cooling unit, the outer jacket is made of ordinary steel, but when used strictly as a heat exchanger and a hot or cold corrosive liquor or gas is used as a heating or cooling medium, the outer jacket is made of corrosion-resisting materials.

This heat exchanger or acid heating unit is produced in Duriron, Durichlor, Durimet, and Durco corrosion-resisting Alloy Steels.

SPECIFICATIONS

Overall Dimensions	12¾" O.D. x 5'0" long
Liquid inlet connection	2" split flange
Liquid outlet connection	2" split flange
Steam inlet connection	1" or 1½" threaded
Steam outlet connection	1" or 1½" threaded
Heating Surface	14 sq. ft.
Steam pressure recommended	75 lbs. maximum

THE DURIRON COMPANY, Inc.

438 N. Findlay St. Dayton, Ohio

hot mill, are operating at full capacity this week.

Strip Steel

Some of the mills have entered a considerable tonnage of hot-rolled strip from the Detroit territory, which is enabling them to maintain better rolling schedules. Some new fill-in orders for small lots have come from General Motors parts plants which still have considerable strip in stock. Demand for cold-rolled strip has expanded, resulting in quite an improvement in orders for hot mill material from cold rolling plants. The local narrow hot strip and cold strip mills are operating at 50 per cent capacity this week.

Bars, Plates and Shapes

Forge shops and other consumers in the automotive field have increased their specifications for bars. However, miscellaneous demand is not so active as recently. Because of a seasonal decline in production, orders from makers of agricultural implements and road scrapers have dropped sharply. In the construction field there is increased activity in small lots of structural shapes for private work, but there is a scarcity of work requiring good tonnages. For a steel plant extension in Lowellville, Ohio, 170 tons has been placed. New projects include a biscuit factory in Dayton requiring 300 tons. The Easterly sewage disposal plant in Cleveland, taking 680 tons of shapes and reinforcing bars, for which bids have been taken, may not be awarded for a week or two. Specifications for considerable tonnage of reinforcing bars for the Muskingum district conservancy project that were awarded some time ago are now reaching the mills.

Fluorspar

Domestic fluorspar has advanced $1 to $1.50 a ton. Efforts to put prices on a higher level have been in evidence for some time. New prices for the washed grade are $15.50 for all-rail and $16.50 for barge shipment. The market is showing considerable activity.

Scrap

The market remains dull, with activity limited to small purchases by dealers to fill outstanding orders. Prices appear fairly firm in spite of the absence of new consumer demand. No. 1 heavy melting steel is bringing $12.25 a ton and blast furnace grades $8 a ton for delivery to local consumers. While there is some disposition to hold scrap for an advance, prevailing quotations are bringing out a sufficient supply to meet current requirements.

Demand Maintained At Cincinnati

CINCINNATI, Oct. 22.—Pig iron demand is well maintained, with bookings totaling about 1500 tons, on a parity with those of the previous week. The sale of about 900 tons of Southern iron, of which 400 tons was in one order, was of particular interest. Purchases are in excess of immediate needs to provide inventories against expected price advances. Foundries are maintaining melt at about 40 per cent of normal.

Coke producers report heavier specifications for foundry grades. In fact, some producers are pressed to meet demands. Recent price advances on by-product foundry coke to $9.50, delivered in Cincinnati, have not affected consumer interest.

Demand for finished sheets is unabated, although the character of ordering has changed slightly. Buying by automotive and refrigerator manufacturers has increased, while demand for galvanized sheets is receding. The growing needs of washing machine and other household equipment makers have stimulated miscellaneous demand sufficiently to offset the withdrawal of jobbers from the market. Open-hearth operations have moved upward four points to 85 per cent, following an increase in ingot production by one mill interest.

Sales of small tonnages of scrap reflect mill pressure on prices. Dealers are maintaining bids at present levels, but the refusal of mills to recognize a stronger market tends to soften the undertone.

Stove Makers Rushed In St. Louis Area

ST. LOUIS, Oct. 22.—Liberalizing of loan arrangements by the FHA, permitting the purchase of stoves on long terms, has proved a stimulus to the stove manufacturing trade, and the foundries at Belleville, in the St. Louis industrial district, and at Quincy, Ill., and Hannibal, Mo., are reported to be operating at the highest rate in years to supply the demand. As a result, there has been a further stepping up of the pig iron melt of these industries. Sales of one pig iron producer in the St. Louis territory in September were the heaviest of any month since August, 1929. Shipments for October promise to equal those of September. Because of the heavy buying prior to the opening of the fourth quarter, sales have fallen off. The buying was for requirements for the remainder of the year, and some melters bought a volume sufficient to last them through January and February of next year, unless the improvement in business now being manifested should require the melting of this extra iron during the current year.

Missouri Highway Commission will open bids on Nov. 8 for a bridge over the Missouri River at Weldon Springs, which will require 4923 tons of structural steel, divided as follows: 2233 tons of carbon; 1567 tons of silicon; 165 tons of copper-bearing, and 58 tons of cast steel. The LaSalle Iron Works have been awarded 150 tons of structural steel for a floral conservatory in Forest Park, St. Louis.

The scrap market is firm. Offerings are light, and dealers' stocks are reported to be the lowest in 10 years. No. 2 heavy melting steel has advanced another 25c. a ton, and railroad malleable is 50c. a ton higher. The Missouri-Kansas-Texas Railroad has sold a list of 35 carloads of scrap.

Coal Strike Continues In South

BIRMINGHAM, Oct. 22.—With the peak of sheet and wire business past, steel mills are now looking forward to substantial increases in bar and structural tonnage from highway and PWA contracts which are to be placed in the next 60 days. Already there has been a steady upward movement in this tonnage. New projects in prospect in the Southeast during the next two months run close to $25,000,000. Bid dates for 55 Alabama PWA projects were announced last week. The Alabama highway department last week also opened bids on 12 projects, to cost about $1,200,000. Six of these were grade separation projects. Georgia will open bids early in November on about $1,500,000 of new highway work.

Steel mill operations have slackened but little since the first of the month. Sheet production has been especially heavy. The rail mill operated four days last week and is closed this week. Work will probably be resumed next week to roll about 6000 tons.

Open-hearth operations ranged from 13 to 14 last week. During the last half of the week the Tennessee Coal, Iron & Railroad Co. operated all nine at its Fairfield plant. Gulf States Steel is working five out of six at Alabama

City. The schedule this week will probably be 13.

Pig iron demand has improved. The continuation of the coal strike, now in its sixth week, may have produced some of the increased business.

Blast furnace operations are unchanged, with seven stacks in production. Five are on foundry iron and two on basic.

The coal strike is still deadlocked, with both the operators and union holding firm. Last week Governor Graves conferred with representatives of both sides. Saturday he came to Birmingham for a talk with industrial leaders. There is a report that he may offer to remove the 2½c. coal tonnage tax and the 4½c. iron ore tonnage tax as a factor in securing an agreement.

Current pipe bookings are still rather light, but November gives promise of better business.

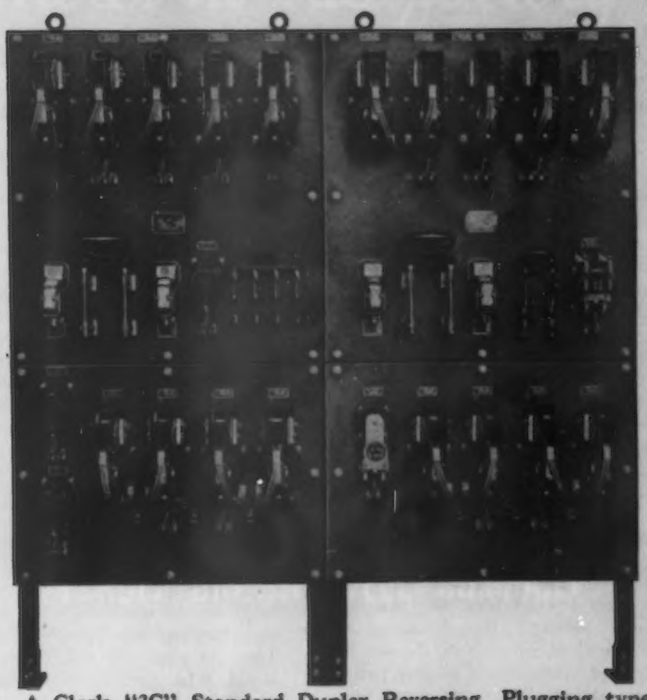
Scrap Exports from Boston Resumed

BOSTON, Oct. 22.—Although the tonnage involved is comparatively small, scrap exports to Italy have been resumed. One steamer is loading machinery cast, turnings and miscellaneous scrap, and another 2500 tons of No. 2 steel for Italy, both boats flying the Italian flag. For the cast, $8.75 to $9.10 a ton delivered is being paid; for turnings, $5.25; for No. 2 steel, $8.50 to $8.75, the former top price. The cast originally was earmarked for Japan but was resold to Italy, Japan being out of the market for the remainder of 1935. Providence, R. I., exporters expect to load a boat for Italy next month. Exporters have plenty of orders on books, but on other than Italian boats insurance rates are prohibitive. Some scrap is moving into Pennsylvania, but the market generally is quiet with prices unchanged. The American Steel & Wire Co., Worcester, Mass., is out of the market, while a Rhode Island mill is buying small lots of No. 1 steel from local interests at $8 a ton delivered, and No. 2 steel at $7.

A North Andover, Mass., textile machinery maker has bought 500 tons of No. 1 Buffalo pig iron, but otherwise the iron market is much quieter than earlier in October. A majority of foundries apparently have covered their needs for a while, at least, and others who were inquiring for small tonnages have decided not to buy just now.

Demand for foundry coke has improved, especially for immediate shipment.

CLARK..
AUTOMATIC STEEL MILL CONTROL EQUIPMENT



A Clark "3C" Standard Duplex Reversing, Plugging type of Magnetic Control Panel for the operation of two motors in parallel on the Bridge motion of Electric Overhead Traveling Crane.

Panel is complete with Overload and Under-Voltage Protection and utilizes Clark's exclusive "Vari-Time" acceleration feature.

THE CLARK CONTROLLER CO.
1146 East 152nd St.
CLEVELAND, OHIO

Crucible Issues Tool Steel Catalog

HIGH speed, carbon and alloy tool steels manufactured by the Crucible Steel Co. of America, 405 Lexington Avenue, New York, are described, and applications illustrated, in a new catalog entitled Tool Steels, issued by the company. A feature is a guide for the selection of tool steels, which covers more than 250 applications, alphabetically arranged, and giving first, second and third choices. General working instructions for tool steels, including forging, normalizing, annealing, hardening, etc., as well as working instructions for particular steels, are given. Separate sections are devoted to the company's Rex high-speed steels; high-carbon high-chromium die steels; hot work steels, chisel and punch and a number of other tool steels.

Demand and Output Off in Philadelphia Area

Year-End Prospects for Structural and Reinforcing Steel Are Brighter—Miscellaneous Orders Smaller Than in September—Scrap Steady

PHILADELPHIA, Oct. 22.—The steel fraternity here continues to sing the song of optimism and is generally very expectant as to what the turn of the year and first quarter will bring. Nevertheless, mill representatives are currently faced with the fact that bookings have apparently passed their peak. Not only are October orders somewhat under those booked in September, but a survey of the market discloses no new outlet for steel which will open up in the near future. That is, no new outlet with the exception of railroad buying, and ordering from this quarter is still confined to absolute necessities despite an encouraging increase in car loadings. The Norfolk & Western is expected to buy 6000 tons for new cars, but the much publicized intentions of the Pennsylvania to embark on an extensive car program have apparently been tabled for the time being. Neither the Reading Co. nor the Central of New Jersey has signified intention of adding rolling stock despite the intensive selling tactics of railroad equipment builders. The general purchasing officer of the Panama Canal is in the market for 1720 tons of 90-lb. rails and several hundred tons of spikes, tie plates, etc.

With backlogs showing a tendency to decrease, all district mills are naturally enough keeping operations at a minimum level. Open-hearth activity of smaller mills is unchanged, but the major district producer has dropped off several units and the average operating rate for this territory has consequently dropped one point to 39 per cent of capacity.

During the last three weeks there has been a tendency on the part of structural steel fabricators to avoid drastic price slashes, and fabricating prices have improved on the average of $5 a ton. Likewise reinforcing steel bids are steadier at higher levels, resale quotations on pipe are firmer, and bolts and nuts are up to 75 per cent off list after a period of weakness. Jobbers are able to secure an additional 10 per cent off list for stock.

Pig Iron

Sellers in the Cleveland-Chicago area are talking of an inevitable price increase of at least $1 a ton for first quarter. Some sellers in this area have adopted a like attitude, but others are of the opinion that foreign competition and poor consumer demand will combine to discourage an advance at the end of the year. At the present time, new orders for fourth quarter delivery have fallen off considerably, but shipments on old orders are sufficiently heavy to make October the best month of the year. All new orders are for small lots, with jobbing foundries, stove foundries and machinery makers accounting for most of the business.

Sheets and Strip

New business is in smaller volume than a month ago, but sellers look forward to an improvement later in the quarter when automobile buying reaches a maximum. The largest district consumer, Budd Mfg. Co., is taking delivery on about 6000 tons of frame stock from Alan Wood each month, and consumption of autobody steel for Ford, Chrysler and Studebaker units is running about 19,000 tons monthly at present. Heintz Mfg. Co. is turning out auto bodies on a proportional basis. Radio makers are purchasing occasional carloads of strip, and stove makers are constantly in the market for sheets. Several sellers here are figuring on a carload of 18-8 stainless for the gold depository at Fort Knox, Ky.

Bars, Plates and Shapes

No project of any size was awarded during the week, but some very attractive tonnages are coming up for bidding in the near future. Tenders were presented in Washington today on 3710 tons of plates, sheets and strip, 375 tons of bars and strip, and 850 tons of structural and bar-size shapes for destroyers DD 402 to 408. The State of Pennsylvania is taking bids Nov. 1 for bridges in Beaver and Crawford counties, requiring 230 and 440 tons of shapes respectively. About 300 tons will be required for the reconstruction of bridges over the Chesapeake & Delaware canal, and figures go in tomorrow on 650 tons for four Ludlow Mfg. Co warehouses at Edgmoor, Pa. Reinforcing bars are currently in poor demand, but about 7000 tons is expected to be released over the next four months for housing projects and schools in this vicinity. The first two of the 15 Philadelphia schools so far approved were due to come out on Nov. 6, but plans have not yet been released and this date will probably be moved forward.

Imports

The following iron and steel imports were received here last week: 2559 tons of pig iron from the Netherlands and 2013 tons of the same product from Soviet Russia; 2500 tons of chrome ore from Portuguese Africa; 320 tons of iron ore from Spain; 495 tons of steel sheets, 149 tons of iron ore, 22 tons of steel wire, 13 tons of structural shapes, 13 tons of steel bands and 6 tons of steel bars from Germany; 73 tons of steel tubes, 34 tons of steel bars, 9 tons of steel wire and 3 tons of steel forgings from Sweden, and 44 tons of structural shapes, 47 tons of steel bars and 8 tons of steel bands from Belgium.

Scrap

Even though district mills continue out of the market for new scrap commitments, the prices on important grades remain firm in the absence of distress material and on the strength of day-to-day broker buying against outstanding orders. It is probable that the Claymont consumer will shortly release shipments on No. 1 orders, but Coatesville has not yet indicated its intention to release on its contracts. All mills are accepting contracted shipments of No. 2 steel as fast as brokers send them. After being out of the market for some time, one district melter is again buying stove plate and No. 1 cast grades. Foundry cast grades continue as strong as ever, indicative of a sustained demand for castings. A few carloads of No. 2 steel are being delivered at Port Richmond at $10.50 for Italian delivery. However, a considerable quantity is yet needed before a cargo can be shipped.

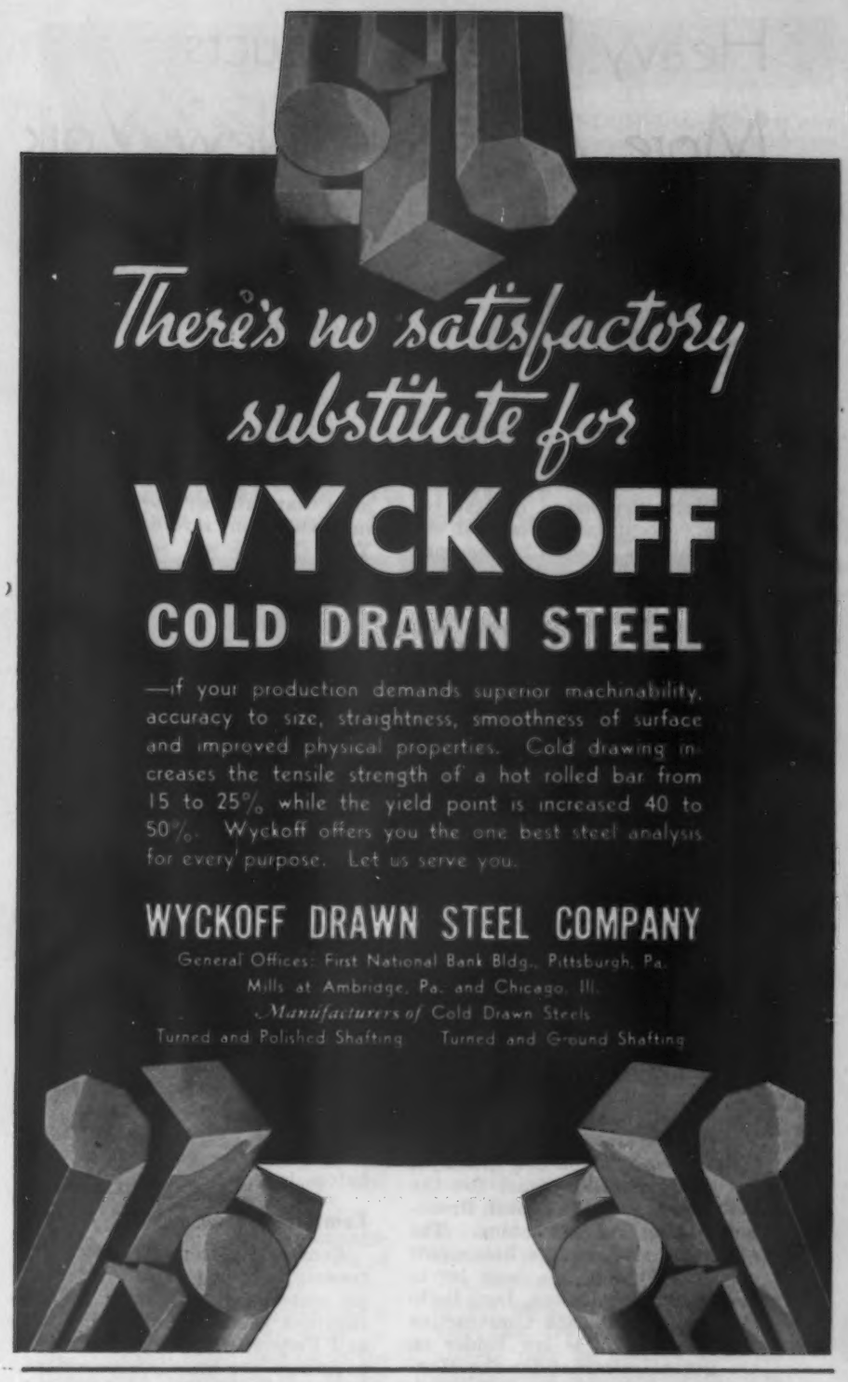
Jones & Laughlin Steel Corpn. and subsidiary companies report for third quarter a net income of $233,914, compared with net loss of $1,826,227 in the third quarter last year. For the nine months ended Sept. 30, the company sustained a net loss of $516,463, compared with loss of $2,864,499 in the corresponding months in 1934.

Scrap Stronger On Coast

SAN FRANCISCO, Oct. 21.—Curtailment of the shipment of scrap to the Orient, from approximately 30,000 tons a month to 10,916 tons in August, is best explained by prevailing conditions on the Coast. Although the price of $10 at Los Angeles and $10.50 at San Francisco for heavy melting has remained unchanged, a definite seller's market exists. Stock piles, in general, are at a minimum and many outlying districts are being called upon to strengthen the supply. Hence, the restricted supply, coupled with the increase in demand in the domestic market, has made less scrap available to the Japanese buyer.

The Pacific Coast Steel Corpn. is reported to have taken the heaviest booking of the week in a contract for 3400 tons of reinforcing bars for the Bonneville powerhouse substructure and fishways. Wallace Bridge & Structural Steel Co. is understood to have taken 400 tons of structural steel on this work. Two projects in Los Angeles, aggregating 260 tons of shapes, will have the material furnished by Consolidated Steel Corpn.

The Metropolitan Water District continued in the limelight by calling for bids, Nov. 19, on the intake structures and Gene pumping plant on the Colorado River aqueduct. Approximately 1860 tons of plates, 640 tons of structural steel, 750 tons of reinforcing bars and 260 tons of miscellaneous steel are involved. The district will furnish the bars. With bids being called for on two crossing undertakings in California it appears as though the Federal program will shortly be under way. Among the new projects listed during the past week there were few plate and cast iron tonnages.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COLD DRAWN STEEL
—if your production demands superior machinability, accuracy to size, straightness, smoothness of surface and improved physical properties. Cold drawing increases the tensile strength of a hot rolled bar from 15 to 25% while the yield point is increased 40 to 50%. Wyckoff offers you the one best steel analysis for every purpose. Let us serve you.
WYCKOFF DRAWN STEEL COMPANY
General Offices: First National Bank Bldg., Pittsburgh, Pa.
Mills at Ambridge, Pa. and Chicago, Ill.
Manufacturers of Cold Drawn Steels
Turned and Polished Shafting
Turned and Ground Shafting

Reinforcing Steel

Awards 6525 Tons—New Projects 4400 Tons

AWARDS

Hartford, Conn., 100 tons, Vedder-Root Co. warehouse, to Concrete Steel Co.

Rochester, N. Y., 400 tons, building for Eastman Kodak Co., to Genesee Bridge Co.

Meredosia, Ill., 165 tons, bridge, to Laclede Steel Co.

Milwaukee, 1800 tons, filter plant addition, to Concrete Steel Co.

State of Illinois, 100 tons, road work to Concrete Engineering Co.

Benton Harbor, Mich., 150 tons, building, to Kalman Steel Corpn.

Bonneville Dam, Ore., 3400 tons, power house substructure and fishways, to Pacific Coast Steel Corpn.

Ashton, Ore., 175 tons, Island Park dam, material purchased by Bureau of Reclamation from an unnamed bidder.

State of Washington, 105 tons, bridges in two counties, to unnamed bidders.

State of California, 130 tons, bridges in seven counties, to unnamed bidders.

NEW REINFORCING BAR PROJECTS

Providence, R. I., 275 tons, bridge.

Buffalo, 250 tons, Federal building.

New York, 1400 tons, New Jersey land portion of Midtown tunnel under Hudson River; bids to be taken Nov. 7 by Port of New York Authority.

Homestead, Pa., 400 tons, mill house for Carnegie-Illinois Steel Corpn., semi-continuous plate mill.

Cleveland, 380 tons, buildings for Easterly Sewage Disposal plant; Lundoff-Bicknell Co. low bidder.

Alameda County, Cal., 500 tons, State overhead crossing in Albany; bids Nov. 6.

State of Nevada, 100 tons, bridges in three counties; bids Oct. 30.

Woodside, Cal., 100 tons, Federal building; bids opened.

Los Angeles County, Cal., 111 tons, State bridge near Fort Tejon; bids Nov. 6.

Los Angeles, 750 tons, intake and Gene pumping plant, material to be furnished by Metropolitan Water District; bids Nov. 19.

Arcadia, Cal., 100 tons, addition to Los Angeles Turf Club; general contract awarded.

Heavy Rolled Products More Active at New York

School and Other Public Projects Reach the Bidding Stage—Shortage of Coal Cars Appears Among Railroads

NEW YORK, Oct. 22.—General demand for finished steel has fallen off as compared with September, but the recession, except in the case of tin plate which is affected by seasonal forces, is accounted for in large part by the anticipatory buying that occurred in several products prior to Oct. 1.

The outlook in the construction field has improved. Pending public work is finally maturing, with the consequence that considerable tonnage is likely to be placed between now and the end of the year. Numerous highway projects are now coming up for bids and a few grade crossing jobs are reaching the bidding stage. Public schools in the metropolitan district on which bids have been or are about to be taken will call for a total of more than 20,000 tons of structural steel.

The general contract for the Brooklyn science building for the Board of Higher Education, New York, requiring 4000 tons of structural steel, has been awarded to T. J. Waters Co., Manhattan. Wilaka Construction Co., Brooklyn, has the general contract for the Franklin Lane High School, Brooklyn, calling for 3750 tons. The structural steel for the Bronx post office, 2500 tons, has been let to Bethlehem Fabricators, Inc., Bethlehem, Pa. Corbetta Construction Co., Manhattan, is low bidder on the general contract for the Manhattan approach to the Triborough bridge, requiring 5400 tons. The New York Transit Commission will take bids Oct. 29 on a section of the West Side elevated highway from Seventy-sixth to Seventy-ninth Streets, Manhattan, calling for 2600 tons. Track depression work for the same project on which the New York Central will take bids Oct. 29 will require 2600 tons.

Bids will be taken Nov. 12 by the International Mercantile Marine-Roosevelt Steamship Co. on a new liner, requiring 15,000 tons of hull steel.

The appearance of a shortage of coal cars among a number of Eastern railroads has encouraged the hope that railroad equipment buying will soon revive. The New York Central will soon start repairs on about 60 hopper cars, using high-tensile steels as an experiment.

Prices are holding rather well. In fact, weakness in concrete bars has definitely abated.

Pig Iron

Local foundry melt continues active, and is responsible for the present steady rate of shipments. Sales, however, tapered last week to approximately 4700 tons, part of which was for delivery outside this district. In the period before, 5200 tons were sold. Fourth quarter needs are fairly well covered as the majority of buyers took occasion to insure themselves against possible higher prices when rumors of this nature first became widespread. Many jobbing foundries in the district, inactive for some time past, are now little more than dead timber, and very likely some will drop out of the picture altogether before long.

Reinforcing Steel

Contract placements were extremely light last week, with interest centering mainly upon sizeable inquiries yet to be satisfied. State and Federal highway construction programs are heavily represented. W. Ames & Co., Jersey City, took the lion's share of the recent Treasury procurement division aggregate lettings in this district. the largest single item having been 670 tons of bars, which went to that company. Although announcements are current that the Tri-boro authority has placed the 5750-ton Randall's Island junction project, definite information on this subject has not come out.

Scrap

Even with war talk the main topic of the day, there is no indication that scrap will become a bullish commodity. Japan is still definitely out of the market, with the exception of incidental shipments of specialty steel, and Italy has become much less of a factor than is generally believed. Several brokers have sent out Italian inquiries and prices offered are no higher than those in effect a month ago. Either Italy has foreseen present requirements and bought in anticipation or is dubious about scrap reaching it from this country. The Pacific & Atlantic Steamship Co. steamer *San Julian* sailed last week with about 10,000 tons of steel scrap for Italy. This boat will be scrapped also. Other boats under consideration for scrapping abroad are the *San Diego, San Pedro* and *San Domingo*, all from the same steamship company. The domestic market is also none too bullish. Buffalo transportation will soon be tied up, and eastern Pennsylvania is not buying heavily. All prices here are holding steady, mostly because there is no distress material overhanging the market. On the other hand, no price advance in the near future is foreseen. After the first of the year, brokers may be forced to lift prices somewhat to take care of federal assessments on labor for old age pensions, etc.

Output Off at Buffalo

BUFFALO, Oct. 22.—Steel production has been reduced with the dropping of one unit at Bethlehem's Lackawanna plant, cutting the total number of active openhearths to 12. Republic Steel Corpn. is operating four and Wickwire Spencer Steel Co., two. The Seneca sheet division of Bethlehem is operating at about 90 per cent.

Considerable fabricated structural business is in the offing and there has been quite a volume of small lots placed, but sizable tonnage is scarce. A Rochester fabricator of reinforcing bars has the contract for a new building for the Eastman Kodak Company. A new Federal building in Buffalo will require 250 tons of reinforcing bars.

The pig iron market is fairly active, though most of the good-sized covering already has occurred. Bethlehem still has three blast furnaces in operation.

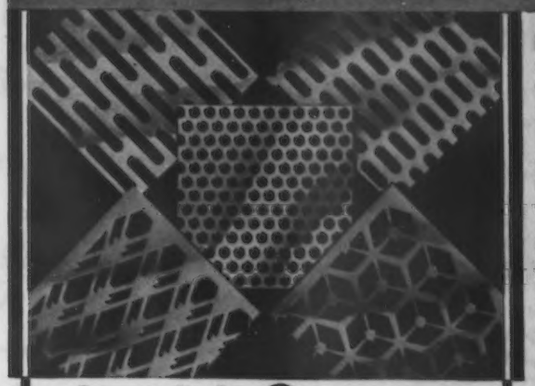
Demand for scrap is predicated largely on the result of the new method of marketing new models of automobiles. Dealers say if the method shows substantial success, a firm scrap market is certain. One mill will pay $12 and $10.50 for No. 1 heavy melting steel and No. 2 respectively, and has received some small lots. This consumer,

desiring to purchase scrap, circularized shippers along the barge canal. It is said the price offered was in line with what the mill would pay for rail shipments, though in the past the mill had always figured a 75c. reduction to cover cost of handling. Another unusual factor in the local situation is that while scrap men here always figured the Chicago market below Buffalo's, the Chicago market is now around $12.75.

Metal Cleaning Book Available

A THOROUGH treatise on the broad subject of metal cleaning has just been released by the Magnus Chemical Co., Inc., 46 South Avenue, Garwood, N. J. This 216-page, profusely illustrated textbook describes all types of cleaning equipment and materials, cleaning methods for a wide variety of ferrous and non-ferrous metals, reviews the subject of coolants and cutting lubricants, and discusses general factory reclaiming of materials and cleaning. Copies of this book will be sent in answer to requests on business letterheads.

PERFORATED METALS



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Losses Prevent Sheet Company From Acceding to Wage Demand

PROFITLESS operation since 1930 was cited as the obstacle to present consideration of a wage advance, in a statement given out by the management of the American Sheet & Tin Plate Co. in answer to demands presented by employee representatives.

The request, which was for a 15 per cent increase in pay, was filed with the company following a general conference of employee representatives of the company, held at Newcastle, Pa., Sept. 25, 26 and 27. Each plant of the American Sheet & Tin Plate Co. was represented at this meeting by three delegates chosen by the employee representatives.

A number of other demands were made, including vacations with pay, an increase in pensions to a minimum of $60 a month, a guarantee of tonnage rates on a daily basis rather than according to the pay period and various amendments to the employee representation plan. The proposal for vacations with pay was regretfully rejected by the management because the present financial status of the company did not permit its adoption at this time. For similar reasons the request for higher pensions was denied. The demand for a guarantee of tonnage rates on a daily basis for occupations in which that guarantee was not yet in force was granted. Various proposed amendments to the representation plan were also agreed to.

The statement of the management denying the petition for a wage rate increase follows:

"The management regrets that it is unable to grant any wage increase at this time. Because of the widespread unemployment in all industries, due to past and current economic conditions, it was necessary to concur in the plan proposed by various Federal Government agencies for shortening the work week as a provision for more generally sharing the work available. This has meant that total hours worked per week for employees has been much less than when the mills were operating on the 1929 schedule and for that reason the average weekly earnings of employees are still slightly below those prevailing before the depression.

"This situation, we hope, will be corrected as business improves and more orders are received. It is a fact that throughout the years 1931, 1932, 1933, 1934 and the first half of 1935 the operations of the United States Steel Corpn. have been conducted at a loss and the earnings have not been sufficient to maintain either the required cumulative dividend on the preferred stock or to allow any return to the common stockholders. Until such time as business conditions improve in our industry it is not possible to consider a general increase in rate. The management will continue, as in the past, to adjust individual rates that are out of line, and employees may be assured that the management is doing everything in its power to increase its volume of business in a way that will permit additional and more regular employment. The rates of pay now in effect in this company are as high or higher than those prevailing in comparable plants throughout the industry and the management feels that it must call upon the employees for a continuation of close cooperation in the practice of every economy and efficiency in order that our plants may be competitive in the industry."

Buying of All Non-Ferrous Metals Curtailed Slightly—Tin Quota Raised

Copper Sales at Low Level as European Price Falls—September Lead Statistics Expected to Be Favorable—Zinc Strong But Quiet

NEW YORK, Oct. 22. — A calmer situation abroad has not encouraged the domestic copper market, and a few sales of secondary metal were made last week below current quotations. Producer bookings yesterday were 300 tons, while in the past calendar week they were 1700 tons. Leading interests here, however, appear satisfied that the official 9.25c. a lb. price level is well fortified. Consumption has been averaging about 40,000 tons a month this year, with the September rate in excess of that figure. In London the market has had to absorb considerable tonnages of metal unloaded by speculators coincident with an easing in international relationships. Accordingly, electrolytic sold there this morning at from 8.55c. a lb. to 8.65c. a lb.

Tin

Buying in moderate volume for fourth quarter positions failed to indicate the true state of demand last week. Spot metal has grown increasingly scarce, and failure to satisfy even November requirements fully has occasioned sellers some embarrassment. Spot quotations, therefore, are largely nominal. In London, however, the spot situation was much relieved when 500 tons was brought in from Holland's Arnheim smelter, and 1500 tons of Banka metal was reported afloat to English ports. Consequently, the premium of spot over futures today stood at £6 10s, whereas a week ago it was £16 5s. In contrast to the domestic position of spot Straits which declined but half a cent during the week, London registered a decline of £6. The International Tin Committee, which met today, again has raised quotas, this time from 70 to 80 per cent. But this action will have little if any effect on the market for the balance of the year. On an 80 per cent basis, annual world production of tin will total 170,000 tons. Estimates fix this year's total consumption at approximately 130,000 tons. Today's New York price for spot Straits metal is 51c. a lb. In London this morning, standards sold at £223 for spot, and £215 10s. for three months. The Eastern quotation was £221 5s.

Lead

September statistics, scheduled for publication yesterday, have not yet been released, but should show a further increase in shipments over earlier months. Meanwhile demand continues at a satisfactory rate, with sheet lead and pipe manufacturers and tin foil and battery makers the principal buyers. Consumers are now largely covering November, though occassionally October is specified. In some instances even October delivery on November bookings has been asked for. Prices are firm at the previously reported levels of 4.35c., St. Louis, and 4.50c., New York, and one leading interest continues to secure a $1 premium on Eastern business.

Zinc

At present demand is light due to the well covered position of consumers, but carlot business from producers' established trade continues to be felt. About 1400 tons was contracted for last week. Prices remain unchanged at 4.85c. a lb., East St. Louis, and 5.22½c., New York, and their position is solid. Sellers appear content to await further developments while they occupy themselves with satisfying orders heavily accumulated on company books.

The Thomas Spacing Machine Co., Pittsburgh, has been awarded contract for 12 needle valves for Boulder Dam, by the Bureau of Reclamation, Denver. The contract price is $214,000, and each of the valves weighs more then 114,000 lb.

The Week's Prices. Cents Per Pound for Early Delivery

	Oct. 16	Oct. 17	Oct. 18	Oct. 19	Oct. 21	Oct. 22
Electrolytic copper, N. Y.*	9.00	9.00	9.00	9.00	9.00	9.00
Lake copper, N. Y.	9.37½	9.37½	9.37½	9.37½	9.37½	9.37½
Straits tin, spot, New York†	51.50	51.87½	51.00	....	50.87½	51.00
Zinc, East St. Louis	4.85	4.85	4.85	4.85	4.85	4.85
Zinc, New York†	5.22½	5.22½	5.22½	5.22½	5.22½	5.22½
Lead, St. Louis	4.35	4.35	4.35	4.35	4.35	4.35
Lead, New York	4.50	4.50	4.50	4.50	4.50	4.50

*Refinery quotations; price ¼c. higher delivered in Connecticut.
†Includes emergency freight charge.

Aluminum, virgin 99 per cent plus, 19.25c. a lb., delivered.
Aluminum, No. 12 remelt, No. 2 standard, in carloads, 16.50c. a lb., delivered.
Nickel, electrolytic, 35c. to 36c. a lb. base refinery, in lots of 2 tons or more.
Antimony, Asiatic, 16.37½c. a lb., New York.
Quicksilver, $69.50 to $71.50 per flask.
Brass ingots, commercial 85-5-5-5, 9.00c. a lb., delivered; in Middle West ¼c. a lb. is added on orders for less than 40,000 lb.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig	52.50c. to 53.50c.
Tin, bar	54.50c. to 55.50c.
Copper, Lake	10.25c. to 11.25c.
Copper, electrolytic	10.25c. to 11.25c.
Copper, castings	10.00c. to 11.00c.
*Copper sheets, hot-rolled	16.25c.
*High brass sheets	14.62½c.
*Seamless brass tubes	16.62½c.
*Seamless copper tubes	16.75c.
*Brass rods	13.12½c.
Zinc, slabs	5.75c. to 6.75c.
Zinc, sheets (No. 9), casks, 1200 lb. and over	10.25c.
Lead, American pig	5.00c. to 6.00c.
Lead, bar	6.00c. to 7.00c.
Lead, sheets	8.25c.
Antimony, Asiatic	17.75c. to 18.75c.
Alum., virgin, 99 per cent, plus	23.30c.
Alum., No. 1 for remelting, 98 to 99 per cent	18.50c. to 20.00c.
Solder, ½ and ½	31.00c. to 32.50c.
Babbitt metal, commercial grades	25.00c. to 60.00c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

From Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig	54.75c.
Tin, bar	56.75c.
Copper, Lake	10.25c.
Copper, electrolytic	10.25c.
Copper, castings	10.00c.
Zinc, slabs	6.25c. to 6.50c.
Lead, American pig	5.20c. to 6.50c.
Lead, bar	8.50c.
Antimony, Asiatic	18.50c.
Babbitt metal, medium grade	19.25c.
Babbitt metal, high grade	58.75c.
Solder, ½ and ½	31.50c.

Old Metals, Per Lb., New York

Buying prices are paid by dealers for miscellaneous lots from smaller accumulators, and selling prices are those charged to consumers after the metal has been prepared for their uses. (All prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible	6.87½c.	7.62½c.
Copper, hvy. and wire	6.75c.	7.25c.
Copper, light and bottoms	5.75c.	6.25c.
Brass, heavy	3.87½c.	4.50c.
Brass, light	3.12½c.	3.87½c.
Hvy. machine composition	5.87½c.	6.37½c.
No. 1 yel. brass turnings	5.00c.	5.50c.
No. 1 red brass or compos. turnings	5.50c.	6.00c.
Lead, heavy	3.50c.	3.87½c.
Zinc	2.50c.	2.87½c.
Cast aluminum	12.12½c.	13.25c.
Sheet aluminum	13.25c.	14.75c.

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German Book on Furnace Operation

VERLAG STAHLEISEN, Düsseldorf, Germany, has just published a concise, 186-page, well illustrated book on heat calculations for design and operation of furnaces, by W. Heiligenstaedt. This book at current exchange is priced at about $4.80.

According to W. Trinks of the Carnegie Institute of Technology, this book contains much original work and for the first time in any publication, the theory of the process of combustion and of characteristic properties of burners is described. The book touches on every engineering problem concerning furnaces used in the iron and steel industry, including theory of heat, the heat balance with its various items, combustion (with space requirements for combustion), heat transfer, conduction of heat with steady and fluctuating temperatures, heating of the charge in furnaces, and heat interchanges in recuperators and regenerators.

Republic Acquisition Of Truscon Completed

CONTROL of Truscon Steel Co. has been acquired by the Republic Steel Corpn. Recently the expiration date of the offer of Republic to Truscon stockholders to exchange their stock for stock in the Republic Steel Corpn. was extended until Oct. 21 and after a meeting of the board of directors of Republic held on that date, T. M. Girdler, chairman of Republic, announced that holders of approximately 75 per cent of each class of Truscon stock have deposited or agreed to deposit their shares under the exchange offer and that the offer was declared effective by the Republic board. "We are preparing to coordinate Truscon plant and distributive facilities with the Republic organization," said Mr. Girdler in announcing the merger.

Truscon stockholders who have not accepted the exchange offer are being advised that they may do so by depositing their stock with the Detroit Trust Co., Detroit, or the Commercial Trust Co., Jersey City, on or before Dec. 15.

TRADE NOTES

Automatic Sprinkler Co. is planning to move its executive offices to Youngstown around Jan. 1, which is the center of the company's sources of supply. The principal requirement of the company is pipe, which is reported to have been purchased from a large independent Youngstown producer.

Lebanon Steel Foundry, Lebanon, Pa., has appointed Peter A. Frasse & Co., Inc., as sales representatives for corrosion, stainless, and heat-resistant alloy cast products. Offices of Frasse Company are in New York, Philadelphia, Buffalo, Hartford, Rochester and Syracuse, and it will represent Lebanon in New York, Connecticut, New Jersey, Delaware, Maryland, Virginia, and Pennsylvania east of Altoona.

Babcock & Wilcox Co., New York, has opened sales office at 1809 Railway Exchange Building, St. Louis. F. C. Brandt, formerly of the Chicago office of company, is in charge of the new office, which will serve eastern Missouri and southern Illinois.

Udylite Co., Detroit, maker of plating and polishing supplies, has opened warehouse at 1943 Walnut Street, Chicago. Company has also appointed Donald Sales & Mfg. Co., Milwaukee, as its distributer in Wisconsin.

Cooley Electric Furnace Co., Indianapolis, has expanded its plant facilities by moving to new location at 1411 East Twentieth Street. Company manufactures electric furnaces and various types of electric heating apparatus.

FINANCIAL NOTES

Acme Steel Co., Chicago, in nine months ended Sept. 30, had consolidataed net profit of $1,319,817, equal to $4.02 a share. For the three months ended Sept. 30 net income was $384,479, equal to $1.17 a share.

Harbison-Walker Refractories Co., Pittsburgh, and subsidiaries, reported for third quarter net earnings, after deductions for Federal and State taxes and other charges, of $462,000, equivalent, after dividend requirements on 30,000 shares of 6 per cent preferred stock, to 30c. a share on the no par common stock. Net earnings in the third quarter last year were $217,700, or 12c. a share on the common. Estimated consolidated net earnings for the first nine months of 1935 were $1,245,700, compared with $1,023,200 in the first nine months of 1934.

Budd Wheel Co., Philadelphia, has declared a dividend of $7 a share on the company's preferred stock, payable Nov. 30, to stockholders of record Nov. 18, 1935. A dividend of $3.50 was paid Sept. 30 and an additional $7 dividend has been declared for payment Oct. 31. Company had profit of $559,599 in first nine months of 1935, after deducting all charges, including depreciation, interest and taxes, compared with a profit of $116,129 for the corresponding period of last year.

Edward G. Budd Mfg. Co. had profit of $31,344 in the third quarter after deducting all charges, including depreciation, interest and taxes. This compares with a loss of $152,048 in the third quarter of 1934. Earnings for first nine months were $310,328, compared with loss of $87,282 in the same period last year.

Continental Can Co., New York, in year ended Sept. 30, had net income of $16,231,650, which, after providing $4,966,165 for depreciation and Federal taxes, left net earnings available for the common stock of $11,265,485, equivalent to $4.23 a share. This compares with $14,586,877 in 1934, from which $4,509,941 was deducted for depreciation and Federal taxes, leaving net earnings of $10,076,936, equivalent to $3.78 on the common shares.

Modern Strip Mill Installed in England

A NEW mill for the hot-rolling of steel strip, which has been erected by Arthur Lee & Sons at the Meadow Hall Works, Sheffield, is claimed to be the most up-to-date in the United Kingdom. Capable of rolling 100 tons per shift, it can produce the wider sizes of strip in the heavy weight coils required in modern practice, supplies of which had previously to be obtained from Continental Europe.

Housed in a building 400 ft. long by 100 ft. wide and 50 ft. high, the mill is equipped with a cogging mill of the three-high type, with rolls 21 in. in diameter by about 5 ft. long, and with three separate units of finishing mills, dealing with widths from 1 in. to 16 in. Each of these finishing mills consists of three rolls mounted on roller bearings.

At one end of the mill is a reheating furnace, of the continuous pusher type, from which the billets and slabs are delivered automatically, one by one, to the live-roller table feeding the first stand in the cogging mill.

A noteworthy feature is the automatic action of the mill, for the wide sizes are manipulated entirely automatically, while the strip from the cogging mill in sizes narrower than 6 in. is only handled once. The new mill has provided considerable employment in the British steel center.

Canadian Output At 60 Per Cent

TORONTO, Ont., Oct. 22.—Steel mills and a number of the car and locomotive plants now are working on the largest backlogs since 1930. It is stated in official circles that the mills are assured of sufficient business to maintain operations at 60 per cent until next spring, and there is a good chance that this rate will continue much longer with the steady flow of new orders being closed. The automotive industry is furnishing a good demand for sheets, castings, hardware, etc., and other substantial orders of like nature are pending for the beginning of the year. It is stated that the Steel Co. of Canada, Hamilton, still is more than a month behind with sheet deliveries and this branch of its works is running at capacity. The agricultural implement industry is taking larger tonnages of raw materials and has stepped up operations considerably in recent months. Shipments, export and domestic, are the best in several years. The mining industry also is responsible for steady movement of steel, tools, mining and milling equipment.

Pig iron sales gradually are expanding and weekly sales now are holding at between 700 and 800 tons. The daily melt has increased steadily of late and now is close to 50 per cent of capacity, with indication of further improvement before the end of the year. Pig iron production also is holding at its peak level for the year, with four stacks blowing. Imports are negligible. Prices are firm and unchanged.

Scrap demand is improving and prices are firm at recently revised levels. There still is upward of 5000 tons of automobile scrap in the Toronto district ready for shipment to United States consumers as soon as the American market is ready to absorb this accumulation.

A.S.T.M. to Study Gaseous Fuels

IN response to numerous requests, the American Society for Testing Materials has organized a standing committee to undertake certain standardization and research work in the field of gaseous fuels. A. C. Fieldner, chief engineer of the experimental stations division of the United States Bureau of Mines, has been elected permanent chairman of this committee, and R. M. Conner, director of the American Gas Association testing laboratory, will act as secretary. The main subjects selected for immediate development are collection of samples, measurement of samples, calorific value and a study of specific gravity or density of gases.

Develops Glass Building Block

DEVELOPMENT of an improved glass block for building purposes, which has stood up under pressure of 72,500 lb. to a single block and which is believed to reduce heat flow, deaden sound, transmit and diffuse light, deflect sun glare and resist fire, has been announced by the Owens-Illinois Glass Co., Toledo, Ohio.

Production of the glass blocks on a large scale is going forward at the Muncie, Ind., plant of the company in response to large orders for the material from builders and architects.

Recent refinements in the manufacture of glass "brick" to make the material meet the most exacting requirements of builders is expected by the company to play an important part in revolutionizing the trend of architectural design for certain types of buildings, including industrial buildings, dairies, breweries, laboratories, filling stations, apartment structures, houses, mausoleums and store fronts.

Official announcement of the new development followed the completion of exhaustive tests conducted by the engineering department of Purdue University for compression, adhesion, air pressure, transmission of heat and diffusion of light. The results were so successful that glass blocks are to be used partially in the construction of a building to be erected in the housing research development of the Purdue Research Foundation.

The Owens-Illinois company also is starting the construction of a large all-glass laboratory building, two stories high, on one of its Toledo properties. The building will use glass blocks entirely on its structure, besides glass wool for insulation of the roof and for air filters in the air-conditioning system.

Structural Steel Fabricators Seek Market

(CONTINUED FROM PAGE 50)

"Too often," he said, "computations based upon simplifying assumptions or the results of photoelastic analysis are considered conclusive when tests of actual structures are needed. The recent investigations on aircraft structures show what can be done in this field if the problems are studied energetically. The fact that structural problems have received comparatively little attention only increases the chances that investigations in this field will not only increase the use of steel structures but benefit the public by making them safe and economical."

Growth of Welded Structures

Robert E. Kinkead, consulting engineer, Cleveland, discussed the control of welding in structural steel fabricating shops. He stated that there has been a notable increase in the use of welding in ordinary structural steel fabrication in the last five years and that the matter of repairs and alterations to existing structures has become of increasing importance. Mr. Kinkead also emphasized the close relation of the control of welding in fabricating shops to the control of profits, and recommended that the institute work out a program of cooperation regarding welding practice which can be of great benefit to its members.

Tomorrow's Machine Tools Are With Us

(CONTINUED FROM PAGE 27)

(planing vs. milling vs. broaching on some work; various methods of gear-cutting and gear-finishing, etc.) within the machine tool industry is going to be most interesting to watch, and will, I believe, be one of the outstanding features of the era of production into which we now seem to be entering. To the buyer of machine tools this means that regardless of which method he chooses, he is going to be enabled through these tooling developments to get the maximum out of tomorrow's machine tools throughout their useful life.

Sometime there will be machine tools as different from those of today as those of today are different from those of 10 or 20 or 50 years ago. H. G. Wells undoubtedly could picture machine tools of the future which will remove metal by disintegrating it with cosmic rays. Others like R. E. W. Harrison and A. L. De Leeuw, well-known consulting engineers, can give you a very clear idea of what will take place in machine design during the next major design cycle. While I cannot speak for Mr. Wells, I do believe that both Mr. Harrison and Mr. De Leeuw will agree with me that for the period in the future with which we all are now concerned, "Tomorrow's machine tools are with us today."

Safety Goes Back To the Foreman

(CONTINUED FROM PAGE 31)

with less experience. Careful reminders, in the form of pamphlets, without scare-heads, but with sound advice to be careful in the handling of machines and tools, gradually have the effect of overcoming the careless attitude which inexperienced men often assume toward a job in order to mask their inexperience.

Departmental safety meetings get a better attendance, and the organization as a whole becomes safety conscious. If the safety record of a department becomes a matter of pride to a foreman and to his men, if it becomes clear to all that lost-time accidents represent pain and suffering, and that no accidents mean more health and happiness in the shop and in the home, then safety has come into its own. And this is not merely true from the humanitarian standpoint. It is good business. Careful people are good workmen. To be safety conscious is going a good way toward being quality conscious, and quality is what factories grow on.

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NEW YORK
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DENVER
SAN FRANCISCO

NRA Review

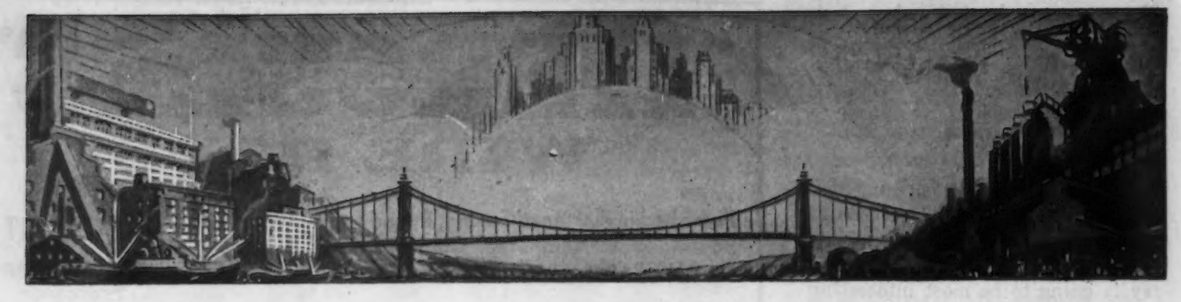
(CONTINUED FROM PAGE 53)

domestic utilization of scrap resources.

Assuming the relative prices of pig iron and scrap are important factors in basic open hearth practice, and considering scrap as only the heavy melting grade, the questionnaire asks at what minimum differential in price of scrap below basic pig iron would the charge be in approximate proportions. If available, manufacturers are also asked to fill out a form regarding purchased and "home" scrap used in open-hearth and electric furnaces and in making pig iron, together with the ratio of total scrap to pig iron charged and total scrap per ton of pig iron produced; also amount, if substantial, of scrap in the Bessemer converter is asked for.

Inquiry also is made if producers can furnish information concerning the approximate amount of raw materials assembled per ton of finished product and the cost of such assembly along the general lines of an excerpt from THE IRON AGE of Aug. 24, 1933.

Calling attention to the September, 1935, issue of *Steel Facts*, published by the American Iron and Steel Institute, the questionnaire refers to an article on stock ownership and seeks further information on the subject. It asks for the total shares of authorized capital stock outstanding; number of stockholders owning of record one to 20 shares of stock each; aggregate number of shares owned by this class; number of stockholders owning of record 20 to 100 shares of stock each; aggregate number of shares owned by this class; number of stockholders owning of record more than 100 shares of stock each; aggregate number of shares owned by this class; number of employees owning stock of record; aggregate number of shares of stock owned by employees; aggregate number of shares of stock owned of record by officers and directors and aggregate number of shares owned of record by the 20 largest owners of stock of record.



Plant Expansion and Equipment Buying

No Change in Machine Tool Activity

MACHINE tool demand is still convalescing from the Cleveland Exposition. There has been no decided indication of change in trend this week, orders continuing to be primarily for the lighter types of equipment.

Inquiry is brisk, however, and there is good ground for the anticipation of a continuance of the upward trend that has characterized the past six months. Jobbing business and repair part business are steady and in good volume.

NORTH ATLANTIC

Seagram Distillers Corpn., 405 Lexington Avenue, New York, and Joseph E. Seagram & Sons, Inc., same address, affiliated, have engaged Joseph & Joseph, Breslin Building, Louisville, architects, to prepare plans for new distillery on about 40 acres near Bernheim Lane, Louisville, recently acquired. It will consist of two main multi-unit plants for production of rye and bourbon liquors, with mechanical bottling works, power house, machine shop and other departments. Cost close to $1,500,000 with equipment.

Board of Education, Kingston, N. Y., plans manual training department in new three-story high school. Cost about $650,000. Financing is being arranged through Federal aid. G. E. Lowe, 286 Wall Street, is architect.

Atlas Canning Co., 423 Thirteenth Street, Brooklyn, food canner, has leased building at 79-36 Eightieth Road, Glendale, Queens Borough, totaling about 17,000 sq. ft. floor space, and will remodel for new plant. Cost over $35,000 with equipment.

Standard Sanitary Mfg. Co., 18 East Forty-fifth Street, New York, a division of American Radiator & Standard Sanitary Corpn., has filed plans for one-story factory branch, storage and loading plant, 40 x 190 ft., at 32-04 Northern Boulevard, Long Island City. George S. Kingsley, 103 East 125th Street, New York, is architect.

Signal Supply Officer, Army Base, Brooklyn, asks bids until Nov. 8 for high-frequency radio transmitters and radio receivers (Circular 56); until Nov. 12, amplifiers, jack boxes, etc. (Circular 58).

Standard Brands, Inc., 595 Madison Avenue, New York, producer of distilled liquors, canned food products, etc., has acquired property at Toronto, Ont., for one-story addition, about 20,000 sq. ft. floor space, to factory branch, storage and distributing plant, operated in name of Standard Brands, Ltd. Cost about $45,000.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 5 for 1740 hand drills for Brooklyn, Boston and Mare Island Navy yards (Schedule 6245); drill chucks for Brooklyn, Washington and Mare Island yards (Schedule 6246); 1474 pairs sailmakers' shears and tinners' shears (Schedule 6256), 1100 ship scrapers, and 36 sets machinists' bearing scrapers (Schedule 6253), 40,263 doz. tungsten hack saw blades (Schedule 6252) for Brooklyn, Mare Island and Sewall's Point yards.

Board of Education, Park Avenue and Fifty-ninth Street, New York, plans manual training departments in three new junior high schools, Nos. 49, 113 and 239 respectively, in Brooklyn and Bronx boroughs, each to cost about $1,500,000 with equipment. Financing has been arranged through Federal aid. W. C. Martin, Flatbush Avenue Extension and Concord Street, Brooklyn, is architect and superintendent for board.

Superintendent of Lighthouses, St. George, Staten Island, N. Y., asks bids until Oct. 29 for 450 welded steel plate buoys, unlighted, each with cast steel bottom counterweight (Proposal 49725); until Nov. 6, 18 steel gas buoys, with towers and counterweights, from 9 ft. diameter by 38 ft. long, to 5 ft. diameter and 15 ft. long, some with bells (Proposal 49723).

Atlantic Lacquer Mfg. Co., 691 Main Street, Belleville, N. J., has acquired part of former plant of Zeller Lacquer Mfg. Co., 31-53 Cordier Street, Irvington, N. J., consisting of group of one-story buildings, about 25,000 sq. ft. floor space, and will improve and equip for new plant, more than doubling present capacity. Cost over $35,000 with equipment. Zeller company recently vacated property noted, removing to Camden, N. J.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 29, for 10 4000-lb. stockless anchors for Kearny, N. J., and Sewall's Point shipyards (Schedule 6212); until Nov. 1, 105,325 lb. nickel-steel chain for Kearny, Sewall's Point and Mare Island yards (Schedule 6211).

Board of Directors, State Teachers' College, West Chester, Pa., plans new power house at institution for central heating. Cost over $65,000 with equipment.

Constructing Quartermaster, Carlisle Barracks, Carlisle, Pa., asks bids until Nov. 9 for one 200,000-gal. elevated steel tank (Circular 19).

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until Oct. 28 for trolleys and wheels (Proposal 169); assembled rheostats (Proposal 173).

Philco Radio & Television Corpn., Tioga and C Streets, Philadelphia, has leased about 16,000 sq. ft. floor space, in building at 374-80 Second Avenue, New York, for new factory branch, storage and distributing unit, a portion of structure to be equipped for service, repairs and repair parts.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 29 for motor-driven drilling machines (Schedule 6221); until Nov. 1, one motor generator set, complete with switchboard (Schedule 6301) for Philadelphia Navy Yard.

NEW ENGLAND

Casco Products Corpn., Railroad Avenue, Bridgeport, Conn., manufacturer of automotive parts and specialties, has asked bids on general contract for two-story addition, 36 x 77 ft. Cost close to $40,000 with equipment. Fletcher-Thompson, Inc., 1336 Fairfield Avenue, is architect and engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 8 for steel forgings for Boston, Norfolk, Mare Island and Puget Sound Navy yards.

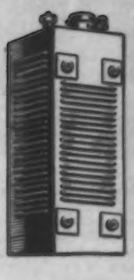
Lynn Gas & Electric Co., Lynn, Mass., has plans for addition to main electric generating plant for increased capacity in steam-generating department, including installation of high-pressure boiler units and auxiliary equipment. Cost over $500,000. Stone & Webster Engineering Corpn., 49 Federal Street, Boston, is consulting engineer.

School Board, 193 Sherman Street, Canton, Mass., plans manual training department in new two-story high school. Cost about $210,000. Appropriation has been secured through PWA. James H. Ritchie & Associates, 100 Arlington Street, Boston, are architects and engineers.

White Co., 842 East Seventy-ninth Street, Cleveland, manufacturer of motor trucks and parts, is acquiring building at Worcester, Mass., for factory branch, storage and distributing plant. Cost about $45,000. Metropolitan district headquarters are at 30 Rockefeller Plaza, New York.

RUGGED

as only steel can be



The Edison is the only Storage Battery of American manufacture which is built of steel. Its electrolyte is alkaline, a steel preservative. All other storage batteries are lead-and-acid.

Edison-powered truck loading freight cars.

INDUSTRY demands a battery that's rugged—and gets it in one that's built of steel. Plates, poles, cell containers, cell covers—all structural parts of the Edison Battery are built of steel. The result is a more dependable storage battery that nets you savings two ways:

First, a steel battery does dependably the work it is supposed to do. Because it is not subject to sudden failure (as are all others) it does not tie-up costly operations.

Second, the per-year cost is lower because a steel battery lasts 2 to 5 times longer than ordinary types.

This advertisement is published to remind men who know steel that steel is the sturdiest material of which to build an industrial battery. Does your company use Steel Batteries?

EDISON STORAGE BATTERY

DIVISION OF THOMAS A. EDISON, INC., WEST ORANGE, NEW JERSEY

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Double Compartment Scale Car with Overhead Operator's Platform. Car provided with Orr Bin Gate Operating Mechanism.

20 Ton Capacity Double Compartment Scale Car for use with Orr type Bin Gates controlled from Operator's Station on Scale Car.

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Concentrate and Calcine Cars for Copper Refineries

Automatic and Remote Controlled Electric Cars

Pushers, Levellers and Door Extractors

Coal Charging Lorries, Coke Guides and Clay Carriers

Atlas Patented Coke Quenching Cars for By-Product Coke Ovens

Atlas Patented Indicating and Recording Scales

Special Cars and Electrically Operated Cars for every conceivable purpose.

THE ATLAS CAR & MFG. CO.

Engineers - Manufacturers

1140 Ivanhoe Rd., Cleveland, O.

Quartermaster, Fort Devens, Mass., asks bids until Oct. 31 for quantity of voltmeters (Proposal 13).

Connecticut Light & Power Co., 39 West Main Street, Meriden, Conn., has plans for new steel gas holder for artificial gas plant. Cost about $75,000.

BUFFALO DISTRICT

United Shoe Machinery Corpn., 126 Mill Street, Rochester, N. Y., has plans for one-story addition to branch plant at Johnson City, N. Y. Cost about $65,000 with equipment. Headquarters of company are at Boston. G. W. Wilkins is district manager at Johnson City.

Niagara, Lockport & Ontario Power Co., Electric Building, Buffalo, plans new transmission and distributing lines, with power substation and service facilities for rural electrification in parts of Allegany, Monroe, Genesee, Ontario, Wyoming and other counties, about 1615 miles. Cost over $2,000,000.

Will Corpn., 845 Maple Street, Rochester, N. Y., manufacturer of chemical plant equipment, processing machinery, parts, etc., has plans for one-story addition, 120 x 180 ft., with extension, 28 x 185 ft. Cost over $60,000 with equipment. Gordon & Kaelber, 311 Alexander Street, are architects.

SOUTH ATLANTIC

Abbeville Coca-Cola Bottling Co., Abbeville, S. C., has let general contract to Barge-Thompson Co., 136 Ellis Street, N. E., Atlanta, Ga., for one-story addition to bottling works, and improvements in present plant. Cost over $30,000 with equipment. Francis P. Smith, Norris Building, Atlanta, is architect.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 29 for one constant voltage reversing planer control for Charleston, S. C., Navy Yard (Schedule 6278).

City Council, Brunswick, Ga., has plans for new municipal electric light and power plant, including distributing lines, for which bids will be asked on general contract early in December. Cost over $100,000 with equipment. J. F. Ahern, 2355 Post Street, Jacksonville, Fla., is consulting engineer.

Board of Education, Aiken County, Aiken, S. C., plans manual training department in new three-story and basement senior high school. Cost $200,000 with equipment. Fund has been secured through Federal aid. Willis Irvin, S.F.C. Building, Augusta, Ga., is architect.

SOUTH CENTRAL

Cave Springs Distillery Corpn., Newport, Ky., recently organized by Albert Mayer, Newport, previously identified with John Wathen, Distillery Co., Lebanon, Ky., has acquired about 35 acres near Newport as site for new plant. It will consist of one and multi-story buildings, with steam power house, machine shop and other mechanical departments. Cost about $175,000. A new townsite will be established at plant location to be known as Wilders (Campbell County), Ky. Mr. Mayer will be president of new company, and Arthur Fischman, vice-president.

Director of Purchases, Tennessee Valley Authority, Knoxville, Tenn., asks bids until Oct. 28 for steel towers and accessories for new Wilson dam-Wheeler dam transmission line; until Oct. 29, one 100-ton transfer car for handling transformers and other electrical equipment at Wheeler hydroelectric power plant until Nov. 1, mechanical and electrical equipment, drives for conveyor belting, etc., for handling concrete and aggregates for storage, central mixing plant, and recovery system, at Pickwick Landing Dam.

Belle of Anderson County Distilling Co., Lexington, Ky., J. H. Hawkins, president, has acquired about 75 acres, improved with several buildings, at Camp Nelson, near Lexington, and will establish new distillery at that location. New buildings will be erected and present structures remodeled. Cost close to $100,000 with equipment. C. C. and S. K. Weber, 111 East Fourth Street, Cincinnati, are architects; Joseph Brandt, Bardstown, Ky., is consulting engineer.

Constructing Quartermaster, Fort McClellan, Ala., asks bids until Nov. 6 for new one-story truck parts and repair shop.

City Council, Tarrant, Ala., plans early installation of new electric power distribution system, including transmission line connections and power substation facilities. Fund of $328,000 has been secured through Federal aid.

City Council, Lexington, Ky., has approved plans for new municipal airport on Newton Pike, to include main hangar, 55 x 120 ft., with shop facilities, oil storage and distributing buildings, and other field structures. Cost over $75,000 with equipment.

WESTERN PA. DIST.

Gulf Refining Co., Gulf Building, Pittsburgh, has plans for new bulk oil storage and distributing terminal on Lake Erie waterfront, Erie, Pa., comprising wharf, pumping station and steel tanks. Project will include two steel pipe lines, 4 and 6-in. Cost about $115,000 with equipment.

Sutton Engineering Co., Park Building, Pittsburgh, manufacturer of machinery and parts, plans rebuilding part of plant at Bellefonte, Pa., recently destroyed by fire. Loss close to $50,000 with equipment.

American Rolling Mill Co., Butler, Pa., has let general contract to H. W. Cox, Blackstone Building, Ashland, Ky., for three one-story additions to steel pipe works at Butler, 40 x 125 ft., 70 x 230 ft., and 78 x 88 ft. Headquarters are at Middletown, Ohio.

MIDDLE WEST

Perfection Tool & Metal Heat Treating Co., 1742 West Austin Avenue, Chicago, manufacturer of tools and other equipment, has let general contract to McKeown Brothers Co., 209 West Jackson Boulevard, for one-story addition, 51 x 106 ft. Cost close to $30,000 with equipment. Edward Nordlie is company architect.

National Gypsum Co., 111 West Washington Street, Chicago, plans addition to plant of Universal Gypsum & Lime Co., 105 West Madison Street, recently acquired. Cost over $400,000 with machinery.

Chicago Rivet & Machine Co., 1830 South Fifty-fourth Street, Cicero, Ill., has let general contract to Austin Co., for one-story addition. Cost about $30,000 with equipment.

City Council, Eveleth, Minn., has secured fund of $886,000 through Federal aid for new municipal electric light and power plant, and electrical distribution system. H. D. Sholund is city engineer in charge.

United States Engineer Office, Commerce Building, St. Paul, Minn., asks bids until Nov. 12 for crane contact rail guard and screen system (Proposal 86); until Nov. 13, two gasoline engine-operated full-revolving locomotive type cranes (Proposal 67).

Board of Gallatin County High School Commissioners, Bozeman, Mont., plans manual training department in new three-story and basement County high school. Cost about $450,000. Financing is being completed. Fred F. Wilson, Gallatin Block, is architect.

Common Council, Exira, Iowa, plans new municipal electric light and power plant. Fund of $75,000 is being secured through Federal aid. H. L. Cory, Baum Building, Omaha, Neb., is consulting engineer.

Acme Steel Co., 2840 South Archer Avenue, Chicago, manufacturer of steel hoops, steel box-strapping, etc., has let general contract to Lundoff-Bicknell Co., 100 North La Salle Street, for one-story addition to plant at Riverdale, Chicago district, 80 x 440 ft. Cost over $100,00 with equipment. Peter R. Hynes is company engineer.

Jos. Schlitz Brewing Co., Milwaukee, has plans by Joseph Schier, company architect, for new stockhouse, 100 x 150 ft., four stories and basement. With tanks, etc., investment will be about $200,000.

John S. Franco, Milwaukee, formerly tractor designer for National Brake &

CHEVROLET keeps 45 branches and assembly plants IN HIGH GEAR with Bell System Teletypewriter Service

CHEVROLET furnishes *fast, economical transportation* to America, and the Bell System furnishes *fast, economical communication* to Chevrolet.

Teletypewriter Exchange Service was introduced two years ago to connect one regional sales office and its subsidiary zone offices with the home office at Detroit. It proved so satisfactory that service was soon extended to other offices. Today, 45 cities are included in a closely co-ordinated network which covers the entire United States.

Traffic normally flows from the zone offices to the regional offices, to the Detroit headquarters, or Flint factory, and return, but any individual office can talk in type direct to any other if occasion arises. Originally installed for sales purposes, the service is now used for advertising, accounting, administrative and manufacturing matters as well.

The speed, the close two-way contact and the accurate written records which "typing-by-wire" provides, have proved invaluable to Chevrolet and to hundreds of other firms large and small. Probably your own business could employ it profitably. Your local telephone company will be glad to discuss it with you. Just call the Business Office. No obligation, of course.

JONES & LAUGHLIN STEEL CORPORATION
AMERICAN IRON AND STEEL WORKS
PITTSBURGH, PENNSYLVANIA

Electric Co., has established plant at 2021 South Fifty-fourth Street to manufacture general line of industrial, farm and general purpose hauling equipment, switching locomotives, etc., with gas and oil engine power.

Electrolite Battery Mfg. Corpn., Inc., Milwaukee, manufacturer of heavy-duty storage batteries, has acquired plant and property of Burnham Brothers. Brick Co. at South Milwaukee, and is installing equipment for production of parts heretofore let on contract.

Milwaukee Railroad, Milwaukee, is considering early rebuilding part of engine house and shops at city limits, Perry, Iowa, recently destroyed by fire. Loss over $50,000 with equipment.

Common Council, Imperial, Neb., plans new municipal electric light and power plant. Fund of about $60,000 is being secured through Federal aid. Henningson Engineering Co., Union State Bank Building, Omaha, Neb., is consulting engineer.

Wisconsin State Board of Control, Madison, has received appropriation from Legislature for new granite and stone cutting plant costing $50,000 at State Reformatory, Green Bay, Wis., and $8,000 additional for purchase of anti-silicosis equipment. Earl H. Eklund is warden.

Public Utilities Commission, Manitowoc, Wis., expects to take bids soon for constructing and equipping addition to municipal generating plant at cost of $441,000. PWA grant has been approved. J. Peter Eastman is chairman.

MICHIGAN DISTRICT

Baldwin Rubber Co., Pontiac, Mich., manufacturer of rubber goods for automotive service, will soon take bids on general contract for two one-story additions, 100 x 142 ft., and 16 x 180 ft. Cost over $80,000 with equipment. L. J. Heenan, Pontiac, is architect. Company is affiliated with Michigan Rubber Co., Owosso, Mich.

Evans Products Co., Union Guardian Building, Detroit, manufacturer of automobile loading devices and equipment, has plans for one-story addition, about 30,000 sq. ft. floor space, for parts production and assembling. Cost close to $100,000 with equipment.

Continental Die Casting Corpn., 2950 East Woodbridge Street, Detroit, has let general contract to A. A. Albrecht Co., Penobscot Building, for one and two-story addition. Cost about $55,000 with equipment. F. J. Winter, Book Tower Building, is architect.

Board of Education, 1354 Broadway, Detroit, plans manual training department in new three-story Western high school, for which bids will be asked soon on general contract. Cost $1,082,000 with equipment. N. Chester Sorensen Co., Industrial Bank Building, is architect; Smith, Hinchman & Grylls, Marquette Building, are associate architects and engineers.

Ford Motor Co., Dearborn, Mich., has plans for extensions and improvements in Rouge paper mill, for manufacture of cardboard, binder board and kindred products for automotive service. Cost over $60,000 with equipment. Giffels & Vallet, Inc., Marquette Building, is architect and engineer.

WASHINGTON DIST.

Purchasing and Contracting Officer, Holabird Quartermaster Depot, Baltimore, asks bids until Nov. 4 for pinions, ball bearings, chain-timing equipment and other automobile parts (Circular 52), parts for automobile trucks (Circular 51); until Nov. 5, brass aluminum and manganese bronze castings and other parts for motorized fire trucks (Circular 53).

William Schluderberg-T. J. Kurdle Co., East Baltimore Street and Eaton Avenue, Baltimore, meat packer, has let general contract to M. A. Long Co., 10 West Chase Street, for three-story addition, 80 x 95 ft. Cost about $50,000 with equipment. H. Peter Henschien, 59 East Van Buren Street, Chicago, is architect and engineer.

General Purchasing Officer, Panama Canal, Washington, asks bids until Nov. 1 for 3000 lb. steel welding electrodes, four boiler-feed pumps, two bevel gear reductions and two spur gear reductions, chain shackles, turnbuckles, copper netting, corrosion-resisting steel tableware, 12,000 sq. ft. steel wire cloth, 12,200 lin. ft. copper wire cloth, 10,000 lin. ft. poultry netting and other supplies (Schedule 3098).

Purchasing Officer, Department of Interior, Washington, asks bids until Oct. 28 for one 20-ton trailer (Proposal 1042).

City Manager, Alexandria, Va., asks bids until Oct. 28 for steel lockers and other school equipment.

Southern States Iron Roofing Co., 6541 Eastern Avenue, Baltimore, with headquarters at Savannah, Ga., plans one-story addition, primarily for storage and distribution. Another addition will also be erected later.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Oct. 29 for one power press (Schedule 6238), one shaper (Schedule 6263), one metal-cutting machine, all motor driven (Schedule 6259), lathe chucks (Schedule 6290) for Norfolk, Va., Navy Yard; one motor-driven milling machine (Schedule 6230), one motor-driven drill press (Schedule 6228) for Keyport yard; until Nov. 1, parts for motor boat gasoline engines (Schedule 6239) for Sewall's Point yard; steel welding electrodes (Schedule 6287) for Eastern and Western yards.

SOUTHWEST

Hyde Park Breweries Association, Inc., 2110 Salisbury Street, St. Louis, has let general contract to A. H. Haeseler Building & Contracting Co., 2346 Palm Street, for one-story addition to brewery, at 2136 Mallinckrodt Street and improvements in present plant. Cost close to $50,000 with equipment. Expansion and improvements in other units will be carried out soon.

John Deere & Co., Wellington, Kan., manufacturers of agricultural machinery and implements, are considering one-story addition, 50 x 50 ft. Cost about $35,000 with equipment. Headquarters of company are at Moline, Ill.

Common Council, Phillipsburg, Kan., has plans for new municipal electric light and power plant, using Diesel engine generating units, and electrical distribution system. Fund of $120,400 has been secured through Federal aid. Paulette & Wilson, Farmers' Union Building, Salina, Kan., are consulting engineers.

School District No. 6, Shawnee Mission, Kan., care of Joseph W. Radotinsky, Commercial National Bank Building, Kansas City, Kan., architect, plans manual training department in new two-story and basement high school on Newton Road. Cost $150,000.

Utah Refining Co., Kilgore, Tex., operated by Potter Brothers, plans extensions and improvements in gasoline refinery including new equipment. Cost over $50,000.

City Council, Temple, Tex., plans new municipal electric light and power plant, including electrical distribution system. Cost about $750,000. Financing is being arranged through Federal aid. Garrett Engineering Co., 300 Hughes Street, Houston, Tex., is consulting engineer.

OHIO AND INDIANA

Automatic Reclosing Circuit Breaker Co., 1304 Indianola Avenue, Columbus, Ohio, has let general contract to Frank Mattheas, 427 Dunedin Avenue, for one and two-story plant unit, 180 x 240 ft. Cost about $70,000 with machinery. T. W. Brooks, 269 East Broad Street, is architect.

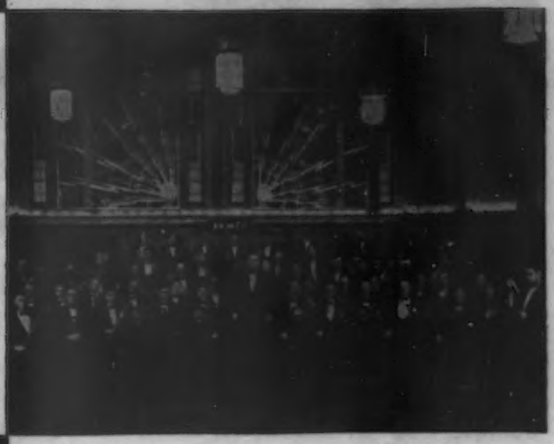
Eagle-Picher Lead Co., Temple Bar Building, Cincinnati, has asked bids on general contract for two-story addition,

FRANK SIMON, CONDUCTOR

THE ARMCO IRONMASTER

Strike up the Band

THE FAMOUS ARMCO BAND



WJZ New York	WSYR Syracuse	WENR Chicago
WBZ Boston	WHAM Rochester	KWK St. Louis
WBZA Springfield, Mass.	KDKA Pittsburgh	WMT Cedar Rapids Waterloo
WFIL Philadelphia	WGAR Cleveland	KSO Des Moines
WBAL Baltimore	WXYZ Detroit	KOIL Omaha Council Bluffs
WMAL Washington, D. C.	WLW Cincinnati	WREN Kansas City

At 10:30 Eastern Time on the evening of October 28, Conductor Frank Simon will lift his baton . . . Another series of Armco Ironmaster Broadcasts will be underway over the NBC Blue Network.

Monday nights thereafter will see thousands of family parties enjoying the fine music of radio's most popular band. And that old favorite, the Armco Ironmaster, will be at the "mike" again with his fascinating stories of current industrial developments.

FABRICATORS who use Armco flat-rolled iron and steel grades benefit appreciably by the product-acceptance these broadcasts generate. This seventh year of radio broadcasting coupled with fifteen years of advertising in popular national magazines has created a vast reservoir of good will for products made of Armco metals. It is almost a buying religion for people to ask, "Is it made of Armco INGOT IRON?" . . . or Armco Stainless, or some other well-known Armco metal. • Listen in to this first Monday-night Armco broadcast on October 28, and judge for yourself what it means to use Armco Iron and Steel — *beyond the good fabricating qualities of the metals themselves.* The American Rolling Mill Company, Executive Offices, 703 Curtis St., Middletown, Ohio.

ARMCO

The name in iron and steel that millions know

● Features: 1. Absolute minimum of headroom consistent with safe, durable construction. 2. Direct worm drive. 3. Few moving parts. 4. Totally enclosed. 5. Automatic lubrication. 6. Noiseless operation. 7. Rope or push button control. 8. Anti-friction bearings. 9. Ball bearing trolleys with swivel yokes permit hoist to negotiate curves of small radius. 10. Hoist frame supported by trolley yokes and not suspended from king pin.

Sprague Hoist Division: SHEPARD NILES CRANE & HOIST CORP.
356 South Schuyler Avenue, Montour Falls, N. Y.

primarily for storage and distribution. Cost close to $100,000 with equipment. Hillsmith & Co., 108 East Third Street, Dayton, Ohio, are consulting engineers.

George J. Rheuban, Youngstown, Ohio, has acquired former plant of Superflex Cord Tire Corpn., East Palestine, Ohio, and will improve for manufacture of tires for automobiles and light trucks. Cost over $45,000 with machinery. New company will be organized to operate plant, headed by Mr. Rheuban, operator of chain of automotive accessory establishments in Youngstown area.

Siegfried Loewenthal Co., 101 High Street, Cleveland, distiller, has asked bids on general contract for one-story addition, 90 x 120 ft., for increased capacity, storage and distribution. Cost close ot $100,000 with equipment. W. S. Ferguson Co., 3030 Euclid Avenue, is architect and engineer.

Contracting Officer, Materiel Division, Air Corps, Wright Field, Dayton, Ohio, asks bids until Oct. 28 for 4500 utility switch assemblies (Circular 262) until Oct. 29, self-locking nuts and self-locking plate nuts (Circular 264), 43 gasoline meters and 21 oil meters (Circular 277), 50 gun mount adapter assemblies (Circular 269), one four-unit floodlight (Circular 278); until Oct. 30, 1775 8-in. diameter and 1500 10-in. diameter wire brush wheels (Circular 279); until Nov. 1, one tilting arbor saw and one wood surfacer (Circular 293); until Nov. 5, four head assemblies, balloon winch mooring mast (Circular 291), twist drills (Circular 289).

Board of Trustees, Indiana University, Bloomington, Ind., John W. Cravens, secretary, has plans for extensions and improvements in power house at institution, including new equipment. Cost about $125,000 with machinery. Financing has been arranged through Federal aid. Charles R. Ammerman, Century Building, Indianapolis, is consulting engineer.

PACIFIC COAST

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until Nov. 1 for one motor-driven surface vertical grinder (Schedule 6231); until Nov. 5, one motor-driven dowel machine (Schedule 6261), one hack saw (Schedule 6294), five CO_2 indicators and recorders, combined (Schedule 6243) for Mare Island, Navy Yard; until Nov. 1, 15,200 ft. lighting and power cable, and flame-proof triplex cable (Schedule 6226) for Mare Island and Puget Sound yards; electric log equipment, including speed indicators and distance traveled recorders, converters, transmitters, etc. (Schedule 6215) for Puget Sound yard.

Fred Hoffman, Long Beach, Cal., care of Burt L. Craig, 3759 Brayton Avenue, engineer, has let general contract to Frederick Tucker, 913 Olive Avenue, for new one-story machine shop, 50 x 75 ft. Cost about $25,000 with equipment.

Libby Fruit Packing Co., Phoenix, Ariz., has plans for first unit of new one-story packing plant, about 18,000 sq. ft. floor space. Cost about $35,000 with conveying, loading and other equipment. Another unit will be built soon, costing close to like sum. Lescher & Mahoney, Title & Trust Building, are architects.

Los Angeles Water and Power Bureau, 207 South Broadway, Los Angeles, D. P. Nicklin, purchasing agent, asks bids until Oct. 29 for 792 electric meters, for three-wire systems.

Todd Seattle Dry Docks, Inc., Harbor Island, Seattle, has begun construction of new 15,000-ton floating drydock, divided into five units capable of being operated individually or collectively, with shop facilities, cranes, conveyors and other equipment. Cost about $500,000 with machinery.

Board of Education, Mount Vernon, Wash., plans one-story manual training shop at new school. Fund of $115,000 is being arranged through Federal aid. N. Torbitt, 4737 Eighteenth Street, N. E., Seattle, is architect. Joseph A. Reeves is school superintendent.

Saticoy Lemon Association, Montalvo, Cal., has let general contract to Rainey & MacIsaac, 6624 Stanford Avenue, Los Angeles, for one-story addition, 112 x 169 ft., to fruit packing plant. Cost about $50,000 with conveyors, loaders and other equipment. Roy C. Wilson, Santa Paula, Cal., is architect.

Standard Oil Co. of California, Financial Center Building, San Francisco, has engaged Stone & Webster Engineering Corpn., 49 Federal Street, Boston, to design and supervise construction of new steam power plant at refinery at Richmond, Cal., including improvements in different parts of plant. Cost about $1,200,000 with equipment.

FOREIGN

Distillaria dos Productores de Pernambuco, S. A., Pernambuco, Brazil, recently organized under direction of Ministry of Industry, Pernambuco, has plans for local alcohol distillery, comprising group of units, with power house, machine shop and other mechanical departments. Cost about 14,000,000 contos ($765,000) with equipment, and of which amount 10,000,000 contos ($546,450) will be subscribed by State Government.

Boulton & Paul Aircraft, Ltd., Wolverhampton, England, manufacturer of airplanes and parts, has plans for one-story additions for parts production and assembling. Cost about $450,000 with machinery.

Anglo-Iranian Oil Co., Ltd., Abada, Iraq, is planning additions to local oil refinery for large increase in present capacity, including extensions in storage and distributing facilities. Cost over $750,000 with equipment.

British Admiralty, London, England, has arranged for purchase of former plant of Scottish Amalgamated Silks, Ltd., Argyl Works, Alexandria, Dumbartonshire, Scotland, and will convert for new torpedo manufacturing works, operating in conjunction with present such plant at Fort Matilda, Greenock. Cost over $1,000,000 with machinery.

Briton-Ferry Steel Co., Ltd., Albion Steel Works, Briton Ferry, Glamorganshire, England, plans extensions and improvements, including group of new one-story units and installation of equipment. Cost in excess of $600,000 with equipment.

Granada Gold Mines, Ltd., Rouyn, Que., plans early rebuilding of crushing plant and mill, recently destroyed by fire. Loss over $100,000 including machinery.

Trade Notes

Kennedy Valve Mfg. Co. has appointed William Godbey as its representative in Kansas, Nebraska, western Missouri, and southern Iowa, with headquarters in Kansas City, Mo.

Joseph T. Ryerson & Son, Inc., Chicago, recently completed a new addition to Jersey City, N. J., plant, making available an additional 45,000 sq. ft. of floor space for the stocking of steel and allied lines. Stocks are being rapidly increased. More than 1700 new sizes and kinds of steel have already been added, making a greatly increased steel-service immediately available to the Eastern area.

Kent-Ervin Engineering Co., 732 Builders Exchange Building, Minneapolis, has been appointed agent for line of boiler water conditioning and control equipment manufactured by the Elgin Softener Corpn., Elgin, Ill. The Kent-Ervin organization will serve Minnesota, northwest Wisconsin, and North and South Dakota.

Penola has the Right Cutting Oil for Every Cutting Job

TWENTY years ago Penola made life easier for the buyer by pioneering with the first complete line of cutting oils and compounds, to meet the needs of high speed operations.

Penola has further simplified the buyer's problem by reducing to an absolute minimum the number of oils needed to take care of all forms of metal cutting, drilling, broaching, reaming, grinding and threading. Which means economy and convenience for you.

Penola realized from the start that the entire responsibility for choosing the right cutting oil and *proving* it is right should be on the *maker* and not on the *user*. Practical men liked the idea.

In fact, they liked it so much that Penola is today one of the largest makers of cutting oils and compounds in the country.

PENOLA LUBRICANTS
PENOLA INC.
Formerly
PENNSYLVANIA LUBRICATING CO.
PITTSBURGH, PA.
Grease works operated at
Baltimore, Md.
Baton Rouge, La. – Eldorado, Kan. – Pittsburgh, Pa.

These Penola Cutting Oils give a bright, smooth finish to the tool and extend its life. They reduce re-sharpening periods, conserving time, power and machine wear.

Penola engineers are always ready to meet the exact requirements of any cutting job with one of Penola's line of Transparent Cutting Oils, Soluble Cutting Oils, Sulphurized and Special Cutting Oils and Cutting Compounds. Next time you have a cutting operation — especially a difficult one calling for a cooling and cutting oil—call for Penola!

1885 — LUBRICATION FOR THE STEEL INDUSTRY — 1935

WELDIT Gasaver

AUTOMATICALLY SHUTS OFF FLAME BETWEEN WELDS

...Saving 25 to 30% in Gas and Oxygen

America's largest production plants use Weldit Gasavers. Cuts cost, eliminates idle torch flame hazards, increases production. Price $10.00. Two weeks trial. Send for circular.

WELDIT ACETYLENE CO. 641 BAGLEY AVE DETROIT, MICH.

TEST THIS WELDIT GASAVER FREE FOR TWO WEEKS IN YOUR PLANT

Granite City Offers High Tensile Steels

THE Granite City Steel Co., Granite City, Ill., is offering two grades of high tensile steel to the trade. Both have their individual fields of application dependent upon the service in which the fabricated article is to be put as well as the modifications desired in the finished design.

One grade has a tensile strength of 65,000 to 75,000 lb. per sq. in. with a yield point of 50,000 to 60,000 lb. per sq. in. and an elongation of 22 to 27 per cent in 2 in. The other grade is a higher tensile steel having an ultimate tensile strength of 80,000 to 90,000 lb. per sq. in., and yield point of 65,000 to 75,000 lb. per sq. in. and an elongation of 18 to 23 per cent in 2 in.

The forming properties of these two steels are very similar to ordinary low carbon, low tensile steels, thus obviating any radical changes in shop equipment. The lower tensile grade will take a 90-deg. sharp bend and a 180-deg. bend over a radius equal to the thickness of the material. The higher tensile steel will take a 90-deg. bend over a radius equal to the thickness and a 180-deg. bend over a radius equal to twice the thickness of the material up to ¼ in. in thickness. Heavier plates naturally require increased radii. The "spring back" is slight if the radius is fairly small but with larger radii spring back may occur to the extent of about 25 per cent. These steels may be formed as desired but it is affected by cold working in that permanent deformation reduces the ductility in relation to the amount of deformation.

Although the welding technique is slightly different on these two grades of steel experiments have shown that any welder experienced in either arc or gas welding can quickly become very proficient.

These materials exhibit remarkable welding properties and because of the composition of the material a very dense weld may be obtained. These high tensile steels may be fabricated such as forming, bending, punching, etc., as desired to an extent governed only by the higher tensile strengths they possess.

In addition to these properties the abrasion resistance of this steel is such that it recommends the use of these materials wherever abrasion is a serious difficulty. These steels are furnished in copper bearing grades, insuring that greater resistance to corrosion for which copper bearing steels are noted.

The major field of application for these new products is in the transportation industry where the economic advantage of car construction materials of greater strength for given weight has been recognized. Freight cars are typical of the kind of application which is desirable for these two steels while many successful applications have been made on trucks and truck trailer bodies.

Freight Containers Here and Abroad

(CONTINUED FROM PAGE 25)

traffic both on the rails and on the road. The railroads, however, carry private containers at the same rates as apply on their own containers.

The importance of small shipments in Great Britain, with its dense population, also accounts for the growth of container traffic. British railroad freight cars are small compared with those in this country, having been held down to a carrying capacity of 5 to 10 tons. The small size of the British freight car truck means that its platform space is fully occupied when loaded with a single large container. In other words, the container serves as a removable freight car body.

Containers are fastened to freight cars in Great Britain by means of ropes, or when conveyed on a special chassis by screw shackles. When placed on cartage vehicles the containers are secured by ropes in every case. In contrast, one of the most commonly used containers in the United States is fastened by means of male and female anchorages, the latter being built into the body of the container.

The London Midland & Scottish Railway Co., one of the large British roads, carried 300,877 tons of merchandise in containers in the year 1934. This represented 1.813 per cent of the total tonnage handled outside of mineral class traffic. The British roads make no effort to divert traffic that is being handled exclusively by rail to containers. The purpose of the container is essentially to combat motor truck competition and to obtain freight for the railroads that would otherwise be handled by other means of transportation.

The type of merchandise handled in containers is not restricted except that freight which would be injurious to the container or commodities that are defined in the Classification of Dangerous Goods are barred.

The use of containers is particularly suitable to commodities that call for onerous conditions of packing when conveyed in ordinary freight cars, since by using the container the packing may be either

For Precision
MESTA ROLL GRINDERS

A machine of precision for the finest finishing—but rugged enough to do the heaviest kind of roughing work.

Crowning and concaving attachment entirely built into the machine and guaranteed to produce any desired amount of crown or concavity with absolute uniformity and accuracy.

MESTA MACHINE COMPANY
PITTSBURGH, PA.

THE STARTING POINT of

FORGINGS
CARBON-ALLOY AND SPECIAL BASIC ELECTRIC STEELS

COMPLETE control of all processing from selection of the melting charge to the finished condition is the N. F. & O. *guarantee of quality* in forgings furnished to your specifications—Smooth Forged, Hollow Bored, Rough or Finish Machined.

NATIONAL FORGE AND ORDNANCE CO.
IRVINE, WARREN COUNTY, PENNA., U. S. A.

dispensed with entirely or considerably minimized.

Typical examples of commodities regularly conveyed in containers, according to R. A. Riddles, assistant to chief mechanical engineer, London Midland & Scottish Railway Co., are the following:

Confectionery
Meat, fresh, chilled or frozen
Earthenware
Enameled ware
Tinware
Textiles
Machinery
Frozen Fish
Castings
Stoves, grates, ranges and heaters
Glassware and glass bottles
Glazed ware
Furniture
Household removals
Wireless apparatus

A small type of open wood container, 4 x 7 ft., known as the "H" type, has been the means of securing to the railroads a large proportion of the traffic in building materials, such as brick, tile and facing stone. These containers, being of small design with a carrying capacity of 2 tons, can be hoisted to upper floors of buildings in the course of construction, thereby saving a considerable amount of handling.

Containers used in Great Britain are made of wood, metal-faced plywood or of light steel. The metal containers are mainly of pressed steel with flat or pressed steel panels riveted to the pillars, the former being mild steel of No. 16 or No. 18 S. W. G. (British Imperial standard wire gage) with end doors pressed from 3/32-in. steel sheets. The latest types of metal containers have hinges and other fittings welded to the body.

Special containers for the conveyance of meat, etc., reports Mr. Riddles, are insulated with cork slabs or aluminum foil placed between the sheeting. Many covered containers have been developed for the conveyance of special articles such as bicycles. Containers designed for moving furniture have one end door only, with lath frames inside the body to facilitate packing.

The British containers vary considerably in type but they are roughly confined to four sizes, as follows:

Small open type—3 tons, 125 cu. ft., 7 ft. long by 6 ft. wide.
Large open type—4 tons, 300 cu. ft., 13 ft. 6 in. long by 6 ft. 3 in. wide.
Small covered type—2½ tons, 300 cu. ft., 7 ft. long by 6 ft. 6 in. wide.
Large covered type—4 tons, 575 cu. ft., 14 ft. long by 6 ft. 6 in. wide.

Testing Metallurgical Fuel Oils

(CONTINUED FROM PAGE 23)

In reviewing the foregoing data it could be stated that, next to the simple determination of gravity, there is probably no test used more effectively in the control of metallurgical fuel oils than the viscosity test at various temperatures. The prohibitive cost together with an admitted lack of accuracy and speed of previously employed methods of testing the viscosity of fuel oils have undoubtedly hampered a more general utilization of data pertaining to viscosity. It has been shown that the Steiner viscosimeter obviates many of these shortcomings and that this simple device enables the metallurgist and oil technologist to make more advantageous use of the correlations between temperature and corresponding viscosity, of one type or another. The apparatus is so constructed as to make its operation one of little manual dexterity, thereby making it possible to use the same by laboratory as well as by shop technicians.

On the strength of numerous determinations made by the author, any test made with the new viscosimeter should be duplicable within an experimental error of a fraction of one per cent. The writer also strongly emphasizes the desirability of determining and reporting complete viscosity curves in preference to viscosity numerals, even at some standardized temperature. Single viscosity figures relative to any type of fuel oil do not give any clue as to the future properties at other than the testing temperature, nor are they indicative of the suitability of the tested grades of fuel oil for burners operating at generally higher than the standarized testing temperature. Ample data and experimental proof were offered in the foregoing article for these assertions.

Enormous quantities of fuel oil are consumed annually by the iron and steel industry in the United States and elsewhere. It is really somewhat surprising that the care in metallurgical supervision of all other industrial fuels and raw materials has never been equalled when burning oil in furnaces and power plants. Bearing these viewpoints in mind, it is hoped that the new method of testing one of the most important properties of fuel oil will eliminate the acknowledged tediousness of measuring at least one of these characteristics.

"ears eyes nose"

Bristol's Recording, Control and Indicating Instruments are, so to speak, the "ears, eyes and nose" that see and detect everything you want to know. Let these dependable faithful helpers (a few of which are shown here) tell you constantly, accurately what's going on in your plant. They not only will stop your fretting, but also save you plenty. The Bristol Company, Waterbury, Conn. ***Branches in principal cities.***

Flow Meter

For indicating, recording, controlling, integrating flow of steam, air, gases, liquids. A rugged, reasonably-priced mechanical flow meter that under severe field conditions can be counted on to give precision measurement. Compensates for line pressure. Records rate of flow, line pressure and temperature. Bulletin 425.

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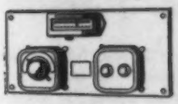

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Device utilized for effecting temperature or pressure control floats from one position to another. It does no mechanical work. It encounters no resistance or friction. Indications are accurate. There is no distortion. Catalog 4001.

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TRADE MARK REG. U.S. PAT. OFF.

PIONEERS IN PROCESS CONTROL SINCE 1889

THE STARTING POINT *of*

FORGINGS

CARBON-ALLOY AND SPECIAL BASIC ELECTRIC STEELS

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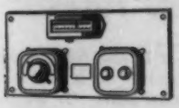

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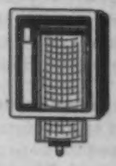

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PIONEERS IN PROCESS CONTROL SINCE 1889

You, too, can use this valuable Bearing Service

QUITE generally there is a greater recognition than ever before in mechanical industry of the importance of bearing designs and alloys. In that connection increasing numbers of machinery and equipment manufacturers are availing themselves of Bunting's free engineering, metallurgical and consulting service.

Our assistance in the making up of bearing specifications often saves money in production and assures satisfaction in the ownership and use of your product. No bearing application is too small to merit this expert analysis and disposition, for no machine is better than its bearings.

To function perfectly any bearing must be designed in the proper proportions as regards length to diameter, wall thickness and oil grooving. Perfect bearing qualities are made available only through proper alloy and correct design. Experience reveals that the perfect bearing often costs less than one not so accurately specified.

Our vast experience with infinitely various bearing applications and a large and capable research department enable us to give you valuable assistance in making bearing specifications. This free service does not obligate you in any way.

THE BUNTING BRASS & BRONZE COMPANY, TOLEDO, OHIO

Branches and Warehouses in All Principal Cities

BUNTING Quality
PHOSPHOR BRONZE
BUSHINGS · BEARINGS
MACHINED AND CENTERED BRONZE BARS

JUST BETWEEN US TWO

Blushing Violets

MODEST is no name for Hailwood & Ackroyd, Ltd., glassmakers of Leeds, England. Consider this gem of advertising restraint:

> "'Hailglass' binds the Empire together—under the beneficent charming rays Empire, Political, Industrial and Love problems are satisfactorily solved."

Apparently 10 Downing Street and the Mdivani brothers never heard of 'em.

"I Christen Thee . . . "

BUT boasting is not unBritish. Take, for example, the names of their warships—H.M.S. "Ferocious," "Intrepid," "Indomitable," "Terrific," "Colossal," and so on.

Of course, there is a certain psychological value in such names. They make an enemy think twice before finding out whether they mean what they say. We don't handle this matter of warship-naming nearly so well in this country. The U. S. just launched a new destroyer a week or so ago. And what was it named? The U. S. S. "Flusser."

There it was in cold type on page 64 of the Oct. 3 issue of that acme of accuracy, The Iron Age. "Flusser" is nil in scare value, and if it is not too late we will contribute toward a pint of California champagne to rechristen it.

Boast

WE have done so little serious bragging lately that you will pardon us for repeating what the man said who stopped in our booth at the Metals Exposition.

He said, "I am going to advertise soon and it will be in The Iron Age. I checked up among my customers and prospects and found that more of them use The Iron Age than any other publication. You scored about 85 per cent."

We mumbled an apology for the missing 15 per cent, but he seemed to think 85 per cent was pretty good, so we hastily agreed with him.

Devil Catches H—*L

OUR anonymous well-wisher in Reading, Pa., sends in another long warning, painfully scrawled in pen and ink:

> *"We are living in the last days. Now, friend, if you have not done so yet perhaps, get into the ark of safety before it is too late. . . . The devil, the old deceiver and soul robber, is a thief, a robber, a rascal, a murderer and a liar, the dirty, rotten old rascal. . . . Be sure now and do keep out of H—*l."*

O.K., Chief. We're trying hard. (*el)

Orchid

AN important operating executive in the automotive industry writes:

> *"I have always regarded The Iron Age as the Bible for any man engaged in the fabricating of steel and the working of metals."*

The Oberleutnant seems to be putting up a heroic fight against his horror of superlatives. No complaints lately. So it will probably be safe to report that the automotive man adds, "It well deserves its position as the outstanding magazine in its field."

Supporter

R. W. ORTH of GE's News Bureau thinks we shouldn't feel too mortified about that ladders-in-alley problem. He says that, despite complaints, the problem is simple:

> *"The only time the ladders will intersect each other at a point fifteen feet above the ground is when they are both absolutely vertical; in other words, when the alley is exactly the same width as the two ladders."*

It does seem to our feeble mind that the ladders would have to incline just a trifle in order to intersect, but you can't prove anything by us as we were home sick the day the teacher taught mathematics. So we will stick to simple ones like this one sent in by Arthur F. Parker of the Department of Metal Processing, University of Michigan.

> *Two cyclists, 25 miles apart, start riding toward each other. One travels 15 miles an hour, the other 10. At the instant they start, a pigeon on the shoulder of one starts flying toward the other. When the pigeon meets the other cyclist it immediately starts back to the first man. The pigeon flies at the rate of 25 miles an hour, and flies back and forth between the cyclists until the two meet. How far does the pigeon fly?*

—A.H.D.